

# PROSPECTUS.

**OUR WEST** aims to be the Magazine of the *Rocky Mountain Section*, and of Colorado especially, as its prominent representative.

Nature has marked out this Section by many peculiarities (geographical, topographical, climatic, etc.,) as a distinct one, and it seems appropriate that it should have a magazine distinctly its own.

For such a publication it will yield abundant topics of interest, for it is a wide field in which to reap, and (to the rest of the world) comparatively an unknown one.

Its physical characteristics alone—its Peaks and Parks and Passes, its Glens and Cañons, its Groves and Forests, its Lakes and Streams and Waterfalls, its Table-lands and its Valleys, its sweeping Plains—might furnish themes for almost endless description.

The researches of topographers, geologists, mineralogists, botanists, and other scientists, are daily unfolding new wonders, the full record of which would require many volumes.

The deeds of daring, the privations and the sufferings of Pioneers in the not far distant Past; the customs and the folklore of the red men who have so long held this vast region for their own, but who are so rapidly disappearing before the on-coming flood of Civilization; the struggles between the old inhabitants and the new; these and kindred subjects can furnish many a thrilling and romantic chapter.

The evidences of an ancient civilization—though scanty as yet—give promise that ere long, the history of a still older race will await the chronicler.

These subjects it is intended shall all find a place, from time to time, in the pages of **OUR WEST**.

The Past, however, must, to a great extent, give way to the Present.

The white man has come to take the place of the red man, and is stamping the super-scription of his kingship on the face of the land. The scream of his locomotive wakes the echoes which a while ago multiplied the war-whoops of the savage. He has turned the fruitful waters upon the Valleys and Plains over which the Indian so lately hunted and fought, and has made their barren wastes to "smile with fields of wavy corn." He has built Churches and Schools and Business Blocks where, but a few years since, the squaws put up the wigwags for their braves. His sheep and cattle are feeding on the range of the antelope and the buffalo. His mining camps are driving the bear and the panther from their lairs in the mountains. And day by day the old order of things is giving place more and more to the new; the Stone has been thrown into the water, and the circles are spreading outwards with continually widening reach.

To present a reflex of this progress of Civilization in its various branches, will be a chief part of our purpose, and to help it forward, to some extent, will not be beyond our ambition.

In brief, it will be sought to make **OUR WEST** such that anyone reading it will gain a full and accurate idea of the Rocky Mountain Section in all its phases—its geography, topography, scenery and climate, its resources, its capabilities, and its wants, its industries and enterprises, its associations and prospects.

To this end, the Editor has already secured the assistance of several contributors, who are prominently identified with the Rocky Mountain Section, and who are eminently fitted, by experience or study, to furnish contributions of interest and value. He trusts that many others, similarly qualified, will be induced to give their aid, and he commends the enterprise to their good will.

Free use will be made of articles of value appearing in other publications, and these Selected Articles, thus brought together from various sources, will, it is believed, be one of the most valuable features of the Magazine.

A short Summary of News will also be published each month. In this, the aim will not be to present a complete chronicle of events, but rather to give a selection of such items of news as will be a fair index of what is going on.

Whilst **OUR WEST** has been made sufficiently large to afford ample space for these various features, it has been thought well to keep it, for the present, within comparatively narrow limits, it being preferable that it should "grow up with the country" rather than that it should start out on too ambitious a scale, only to afford one more example of the rule that "pride goes before a fall."

J. E. LILLER, Editor.

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# OUT WEST.

NEW SERIES.]

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## THE SUMMIT PLATEAU AND THE ROCKY MOUNTAINS.

### PART II.

I have briefly indicated the course which the general rise or upheaval of the Continent has taken. We will now consider the excrescences and irregularities on its surface.

The entire country between the Alleghanies (Appalachian Range) and the Summit Plateau, which extends from the Gulf of Mexico in the South to the watershed of Hudson's Bay in the North, is mainly one vast flat for thousands of square miles in the Prairie States east of the Mississippi; more or less undulating on the Western Plains, most depressed in the valleys of the Mississippi, Ohio, and Missouri, and only sufficiently elevated at its northern limit to determine the flow of the waters in the two opposite directions, north and south. Scarcely a trace of volcanic disturbance is to be seen in all this vast region. On the Summit Plateau, however, mountains for the first time rise from the plains. All along the axis of *general elevation*, independent ranges, varying considerably in direction, height, and extent, have been piled up in great apparent confusion, while here and there some very lofty peaks mark the probable centre of volcanic action in special localities.

To the question, Where is the central range of the Rocky Mountains? I confidently answer, Nowhere! There is no continuous central chain whatever. It appears to me, on the contrary, from my own observations, and from diligently examining the explorations of others, that the so-called Rocky Mountain System, from the northern boundary of the United States to their southern termination, consists usually of two chains of mountain ranges, occupying the eastern and western edges of the Summit Plateau, and separating it from the plains on either side.

These eastern and western chains communicate by means of transverse ridges at irregular distances, thus cutting up the Summit Plateau lying between them into a succession of isolated plains or "parks" of great elevation.

The word "park" in Rocky Mountain phraseology, has a specific signification, and is used exclusively to designate those lofty, well-watered plains, or prairies, to be found all along the Summit Plateau, shut in on all sides by mountains.

Secondary ranges radiate from the primary chains, and jut out into the less elevated plains, east and west, along the whole extent; while the surface of the central or park districts is not unfrequently much disturbed by lesser ranges piled up in endless confusion.

The "Continental Divide," by which I mean the water-parting of the Atlantic and Pacific rivers, passes through sometimes the western chain and sometimes the eastern, crossing and recrossing the Summit Plateau by means of the transverse ridges. Had the Summit Plateau been capped by one vast central pile, this would not have been the case.

Again, the points which show signs, by their lofty peaks, of the most intense volcanic action, and, by the ranges radiating from them, that they were the centres of mountain-making forces, are always to be found along the western or eastern main chains, at the edges, and not in the centre of the Summit Plateau, which represents the backbone of the general upheaval of the Continent.

Such volcanic peaks are Fremont's Peak, Laramie Peak, Long's Peak, Mount Lincoln,\* Mount Gray, Pike's Peak, and Spanish Peaks, none of

\* On a transverse ridge, though nearly central.

which have a central position on the Summit Plateau.

The general direction of the Dual Main Chains is the same as that of the Summit Plateau upon which they rest. From the 49th to the 42nd parallels, it is north-west and south-east; from the 42nd to the 38th, nearly north and south. From about this parallel the main chains part company. The course of the eastern ranges is mostly north and south, until they become lost in the detached mountains between the Rio Grande and the Pecos River; the western ranges run more west of south, until they sink below the surface in the great Madre Plateau of New Mexico.

All the innumerable ranges of hills and mountains which cover the regions west of the main chains, and east of the Sierra Nevada, and which do not obviously jut out from the former, ought not to be placed under the head of the Rocky Mountain System. Such a classification only causes confusion, and is not warranted either from the physical relations or geological formation of the mountains themselves.

To establish the truth of the above assertions with respect to the Rocky Mountains and their general topography, I must refer to the map, while I very briefly point out the facts which have led me to such conclusions.

Commencing at the north, near the British-American frontier, the two main chains are represented by the Bitter Root Mountains on the west, and by the Flat Head Mountains on the east. A transverse range, the Big Hole Mountains, unites these ranges a little south of the 48th parallel.

The Park Region thus enclosed is fully one hundred miles across, by thrice that distance in length. It is traversed in all directions by lesser ranges covered with pine, and enclosing parks and prairies, forests and lakes.

The general slope of this country is towards the northwest, and the only outlet through which the drainage of the entire district can escape is in that direction. The stream there formed is known as Clark's Fork, and is the main branch of the Columbia River.

The Continental Divide, having crossed the

Summit Plateau through the Big Hole Mountains, traverses the western chain in a southeasterly direction for about one hundred miles, where it crosses the Summit Plateau for a second time, at right angles, passes into the Wind River Mountains, and then resumes its former general direction southward. The eastern chain is here represented by hills forming the local divide between the Maddison and Jefferson Rivers, which are the terminal forks of the Missouri. The central, or park district, much resembles that separated from it by the Big Hole transverse range. It is hilly, heavily timbered in places, and contains several fertile parks, such as Big Hole Prairie, Horse Prairie, and Hooked Man's Park.

The duality of the chief ranges is not clearly defined for the next hundred miles; nor is this surprising, considering that in this section one of the main divides of the Western country—viz: that between the waters of the Gulf of California and those of the Northern Pacific—joins the mountains on the Summit Plateau. A little north of Fremont's Peak, the most lofty summit of the Wind River Range (elevation 13,570 feet) the Bear Mountains jut out towards the Great Wahsatch Range, as a spur from the Rocky Mountain System. Along this divide the ridge passes—the waters destined for the Gulf of California, which flow south, being represented by the heads of Green River, the northern branch of the Rio Colorado; and those of the Northern Pacific by the terminal branches of Lewis Fork or Snake River, which latter flows into the Columbia.

To the northeast of the Wind River Mountains, and rising from the plains, are the Big Horn, the Snow, the Girdle, and other "lost mountains," our present ignorance of which, both topographical and geological, will not allow us to group them into any general system.

Southeast of the Wind River Mountains, and forming their southern continuation, runs a range of hills upon the western edge of the lofty Summit Plateau, representing the western main chain. Along this range passes the Continental Divide, having South Pass, Bridger's, and others in its course. The eastern main chain is here called the Black Hills; that part of the Summit Plateau which intervenes is the level park district, known as the Laramie Plains.

The Continental Divide continues its southeasterly direction for about fifty miles from Bridger's Pass in the western main chain, then passes due south for another fifty miles, and then crosses the Summit Plateau from the western to the eastern main chain. The portion of the plateau north of this transverse range (for such is the divide here) is known as North Park; it is cut off from the Laramie Plains by a minor range, and is shut in along its eastern boundary by the eastern main chain, a spur of which juts up into the Laramie Plains, as the Medicine Bow Mountains.

The only outlet for the drainage of North Park is through a cleft in its northern boundary. Through this the waters run, forming the north fork of the Platte River. This stream traverses the Laramie Plains, passes out at their north-western corner, winds eastward around the Black Hills, and finally crosses the plains of Nebraska towards the Missouri River.

Having crossed by the southern mountain boundary of North Park into the eastern main chain, the Continental Divide lies now on the eastern side of the Summit Plateau, but only through 1°; it then crosses again from Long's Peak to the western chain, forming three sides of a square, enclosing the next park, Middle Park, which, of course, is drained by streams flowing west. These streams are the headwaters of the Grand River; they escape through a cleft in the western main chain, and, uniting eventually with Green River, from the Great Colorado of the West.

The next section of the Summit Plateau is South Park; it is hemmed in on all sides, like the other parks, by mountains, the eastern and western main chains being well defined. The Continental Divide traverses the northern and western ranges which bound the park. The drainage is collected into two streams, and passes through the other two sides; that through the eastern forms the south fork of the Platte, while that which escapes through the southern becomes the Arkansas River.

South of the South Park the two main chains of the Rocky Mountain System are never again united by transverse ranges, but diverge very considerably. In the fork thus formed rise the

headwaters of the Rio Grande, and, as the ranges diverge, so does the valley of this important river widen out. High up in the fork, the Summit Plateau is called the St. Louis Park, and, with its crystal streams, its corn-fields, and its lake abounding in trout, is well deemed the most beautiful of all the Parks. It is no less than 7,500 feet above the sea; the mountains bounding it on the east are called the Sierra Blanca, and those on the west the Sierra de San Juan.

Gradually the Summit Plateau widens out, and sinks to the southward, until it can no longer be recognized as a distinct table-land.

The eastern chain of the Rocky Mountain System terminates a few miles southeast of Santa Fe, scarcely reaching the 35th parallel; for the long narrow ranges of gold and silver-bearing mountains, the Placer, Zandia, Manzana, Soledad, Organ, etc., which form an almost unbroken chain along the eastern side of the Rio Grande Valley, should not be classed in the Rocky Mountain System; they are different in formation and more recent in date.

The western chain continues from South Park, to represent the Continental Divide. In it, different ranges have received special local names, but all are spoken of in general terms as the "Sierra Madre of New Mexico." How many, or how few, of these ranges, from the Sierra de San Juan north of the 49th parallel to the Miembres and Burro Mountains, which form the northern boundary of the Great Madre Plateau south of the 32nd, ought to be considered as southern continuations of the Rocky Mountain System, must remain undecided until the country north of Mount Taylor is better known. I expect that a well-marked geological separation will then be found to exist between the more recent volcanic formations of which that mountain and its southern continuations are composed, and the far older structures and primitive upheavals characteristic of the true Rocky Mountain System.

W. A. BELL.

The cattle growers in the counties of Pueblo and Huerfano recently held a convention at Greenhorn and organized a "Cattle Owners' Protective Association," the prime object of which is to keep sheep owners from grazing their sheep on the public lands which the cattle owners wish to use. They propose to apply to the Legislature this winter for a law to that effect. The reasons given for the proposed action are that the cattle owners have used the lands for years, and that cattle will not graze where sheep feed; consequently that the latter have no right to drive the former away.

## MEXICO AND THE MEXICANS IN 1872.

NO. 3.—COLIMA TO GUADALAJARA.

At three a. m., on the third of April, our host woke us up, and, in half-an-hour, all was bustle and confusion in the house. By five everything was ready, and our start was one of the prettiest scenes I ever saw—pack-mules kicking and twisting; horses held by armed servants; our party all armed with Henry rifles and revolvers; the crowd of lookers-on standing gaping around; Señor H. on his grey pony, with a huge umbrella strapped to his saddle; Ali, the Newfoundland dog, bustling round to see that all was right; and the first crimson streaks of sunshine behind the old bell-tower.

We ladies went for the first twelve miles in the old carriage that brought us from Manzanillo. When we had traveled that distance we changed horses; but, as the fresh pair had never been in harness before, and as the harness was mostly tied together with bits of string, we soon decided to get upon our mules before the place where the carriage-road stopped. The little mules paced pleasantly along at about four miles an hour on an average, and, passing through fields of maize and frijole beans, all under irrigation, we came at eleven to the Hacienda de Quesaria, 3,850 feet above the sea.

Here we had breakfast, and went to see the sugar-mill. But the most remarkable product of the estate is "Chicken Wine." As any-one may imagine, we greeted the member of the party who made the discovery with shouts of derision, but he stuck to his statement, and soon a bottle with "Vino de Pechuga" (the breast of a chicken) on the label was produced. We tasted the decoction, and found it very bad rum, with no perceptible taste of feathers. Three barrels, worth \$36 the barrel, are made daily, and two chickens are boiled in every four gallons of the wine. Such is the fact—but the reason why remains a mystery to this day.

We set out again at one o'clock, quite an imposing array,—seven armed servants, five pack-mules, and seven of ourselves. Just out of Quesaria, we heard the road was dangerous from

bands of robbers, and we kept a sharp look-out crossing two deep Barrancas or Cañons before reaching the village of Tonila.

After Tonila we got on the slopes of the Volcano de Colima, which towered above us with smoke coming from a fissure quite low down the side. The country was open and bare of trees, except along the streams, which all seem to cañon here like those of Colorado. We were also pleasantly reminded of our Northern country, by the re-appearance of the Spanish Bayonet. Here it grows into a plant twenty feet high with many branches and fine heads of flowers, and is used as a hedge round the fields.

A four hours' ride brought us over some small Barrancas to the Hacienda of San Marcos, where we were most hospitably received by the owner, and stayed two nights to rest, and make examinations of the country around. The estate is chiefly devoted to sugar culture, and, as it was the middle of "crop-time," when we were there, the whole place presented a most animated scene. The "Alto" (literally "high place,") a small mound of rock about 100 feet high, is surmounted by a beautiful old Spanish Castle, reached by a long flight of steps from the Patio below: here the family live when they are in the country. All around the Patio are low buildings inside strong walls—the sugar mills, stables, corral for mules, a small church, and a long suite of rooms in which we were lodged. The morning we left we had to get up at three, but were amply rewarded by the picture which met us on coming out of our rooms. The whole court was lit up by two huge fires, in cressets, to light the men in the mill, as they were grinding cane all night, and illuminated the walls and towers of the Alto. Close by, our servants were packing and saddling the mules and horses under the orange trees; while some sleeper was still swinging in his hammock at the end of the long piazza.

At four we started down a road between fields of sugar-cane hedged by bananas, and almost immediately found ourselves on the brink of one of the famed Barrancas. To any one accustomed

to the magnificent Cañons of Colorado, I must say that these Barrancas, though very grand, are certainly disappointing. But we, perhaps, are hardly fair judges, as we passed them in the dry season; even from the flowers and ferns which we then saw, we got a faint idea of the magnificent vegetation which covers their sides during the rainy season, when each little thread of water has turned into a foaming torrent, with tropical trees covered with flowering creepers growing down to the water's edge. The trees were full of parrots and a handsome game bird called Chachalapa. Had the heat and dust been a little less oppressive, our ride would have been more pleasant; but, besides the continual climbing up and down the zigzagged roads across the Barrancas, we had to ride for miles through sandy Pine Barrens, meeting and passing great trains of mules (we stopped counting when we reached a thousand) laden with products of the country or stores from the coast, and we were truly thankful when we reached the Barranca of Atenquique, at twelve o'clock, and rested for an hour outside a miserable palm-thatched hut. At the top of the Barranca, we were met by an escort of eight mounted police, and an old "mud wagon" with five mules. We were desired to have all arms in readiness, as the road was infested by swarms of robbers, but after five hours' jolting over a perfectly indescribable track, which they called a road, we arrived at Zapotlan in safety, only having broken down once on the journey.

The news which met us here was not encouraging. The day after we had left Colima it had been attacked by the Revolutionists under Don Gulio Garcia; he, having been defeated by the Government troops, was marching upon Zapotlan to join La Bastida, who was in the neighborhood of Sayula, and Don Gulio was expected to be in front of the city by the afternoon of the next day: The telegraph lines were all cut; scouting parties were out round the city the morning after we arrived, and the troops all under arms. As for ourselves the stage could not start till one a. m., the following night, so that we had perforce to try and make the best of a bad business, and pray that Don Gulio might be detained, as indeed it turned out he was, till we were safe on our way.

Zapotlan is a thriving town of 25,000 inhabitants. Its chief manufactures are soap, of which immense quantities are made to supply all the Western States of Mexico, and Pulque, the national beverage made from the sap of the Maguey, or great American Aloe. The streets are much wider and better and the Plazas larger than those of Colima. The latter are planted with oleanders, oranges, and large shade trees, seemingly a kind of ash.

It is needless to harrow your readers' feelings by a minute description of our lodgings in the hotel. Suffice it to say, that our rooms—devoid of windows—opened by heavy wooden doors on the yard full of mules and horses; and that such a thing as a broom or scrubbing-brush was evidently not common in Zapotlan. It was, therefore, with no feeling of regret that at two p. m. on the morning of April 7th, we left the city in a comfortable Concord stage on our way to Guadalajara; our only fellow-passenger being an old lady, who sat in a corner puffing cigarettes all day long.

For the first two hours, our only light was from the stars, but, owing to the unpleasant reports we had heard about the road, we did not attempt to sleep. Every nerve was strained to catch the slightest sight or sound denoting robbers, and just at dawn, as we were going down a steep divide, between cactus hedges, we were startled by seeing a man suddenly drop into a ditch by our side. Nothing, however, occurred, and we reached Sayula, a pretty old town, at about six a. m., and changed our mules. Here we got most discouraging news. The Government troops were marching towards the town; beyond them the Pronunciados (revolutionists) were in force upon the road; while beyond them again the country was swarming with robbers in bands of any number from two to two hundred.

On starting from Sayula we hid all our arms; the pistols we kept upon us, the rifles were put under the seats, we hoping thereby to save them from the Pronunciados if we were unfortunate enough to come upon them.

A little way out of the town we struck the Lago de Sayula, a salt lake with soda-flats all round it. Some few miles along its side we met

the Government troops, a fine body of cavalry, who confirmed the reports that we had heard. Through choking clouds of alkali dust, which scorched the very skin, and jolting over rocks and gulleys, we at last, about eleven, drove into the miserable village of Cebollas (onions) and pulled up in front of a poor-looking house for breakfast, of which we were in need, as a cup of chocolate at starting was all we had tasted since five, the day before.

Severo, our servant, and Galindo, the captain of Don Ramon V.'s private escort, who came with us from Zapotlan, were left to watch the coach, and we were just sitting down to a very uninviting meal, when two Pronunciados rode into the yard and dismounted. In a minute two more and an officer appeared, and then sent in word they wished to search the coach. Expostulations were in vain; resistance out of the question; for, though we could have easily overpowered them, as, with the exception of the captain, they were badly armed, and all drunk, yet they were but the vanguard of a much larger body. We therefore had to submit to what was inevitable, and in a few moments saw the five precious rifles and a couple of pistols handed in through the windows, and stowed in an inner room, by the women of the house. After much "palaver," the pistols were given back to us, and Major Chavarin, the officer, promised to escort us through the worst robber country, which we were fast approaching, till we could get a regular escort. So off we set again with heavy hearts, which were not lightened as, on one pretence or another, the Major and two of his soldiers disappeared before we had driven many miles out of Cebollas, and at last the two remaining men rode up and said they must go too, and demanded our ammunition. That of course was refused and they sneaked off, leaving us comparatively defenceless just at the time of the greatest need.

There was nothing for it but to go on as fast as possible. So most of the gentlemen got outside of the coach, and we turned away from the horrible alkali plains along a road under the hills, with stone walls on either side, straining our eyes at every gap, and expecting to be pounced upon each instant. In one place where we saw

a white rag put up as a signal, the gentlemen got out and went ahead in a skirmish line, making us barricade ourselves with the cushions and valises. The old Senora behaved admirably throughout, and whispered to me from time to time, in a tone of despair, "Ah! los bonitos Rifles,"—"the beautiful rifles."

The road wound along the foot of the hills, with a rich plain below us, fields of sugar cane, maize, wheat, and grass, and quantities of cattle feeding; but we were almost too anxious to take interest in such things, and after two hours more of intense watchfulness, we were thankful to see ahead of us the town of Santa Ana Acatlan.

Here, thanks to the great kindness of Don Ramon V., of Zapotlan, we were furnished with an excellent escort; and in an hour 28 trusty men all well mounted, on tough, spirited little horses, armed with musket or pistol, and machete (a strong short sword,) and under the command of an old army officer, were ready to take us the whole way to Gnadalahara.

We clattered off through the crowded streets (it was market day,) and up the hill towards the Coronilla Mountain, where one of our party had twice seen sets of travelers robbed. At every turn we met ox or mule trains, who had all been robbed that day, and the drivers looked at us as much as to say, "You're in for it." But our good escort kept up with us, gallantly forming front and rear guard in bad places; and dodging along to cut off corners in the safe ones, and so we crossed the neck of the Coronilla in safety. In the valley below we were told to be in readiness, as a robbery had been committed in the morning, and the ground was strewn with papers left from the plunder; and soon we came to a robber-town, Santa Cruz, and saw some men on horse-back sneaking off in the distance evidently thinking us too strong for them. An hour after sunset we stopped in another robber den, Santa Augustin, to change horses, and get a cup of chocolate, our escort halting close around us to prevent a rush on the coach. Then, with six stout ponies, away we galloped, and with a few more alarms we neared the noble capital of Jalisco. It was a wild scene as, at 10 p. m. we dashed through the empty streets, our muchacho

on the box with a flaming torch, and our faithful escort wrapped in their serapes galloping on either side.

But now our troubles were over, and Gen. C. met us at the hotel and took us straight to the

house of a friend which was, with true Mexican hospitality, put at our disposal, in deed as well as word, and, supper finished, we were thankful to go to our comfortable home-like rooms, after twenty-three and a half hours' traveling.

ROSA DEL MONTE.

## MINES AND MINING.\*

### NO. 1.—THE GEOLOGY OF VEINS AND LODES.

As a general rule, ores occur in veins. Veins are clefts or fissures filled with mineral substances, and intersect both crystalline and stratified rocks crosswise. If the mineral substances which the veins contain are metallic ores, then the veins are also called Lodes.

It is believed that such clefts and fissures were caused by the contraction of the earth's crust during its gradual cooling from a heated state. The whole of the earth's crust is so entirely intersected by such fissures that it is very difficult to find a perfectly compact rock large enough even for a cube of ten feet side.

It is not yet certainly known how the clefts and fissures have been filled with mineral substances. The theory is that it was done partly by metallic vapors which, pervading the plutonic rocks, sublimated on the colder parts of the fissures; and partly by steam and hot-water-streams leaching the rocks, and leaving the dissolved substances in the fissures after evaporation.

Supposing these theories to be true, then the plutonic (crystalline) rocks which constitute the earth's crust and were exposed to the formation of fissures in the most extensive manner, will be our best guides to ore-veins. Experience shows that the contact-places between crystalline and stratified rocks are in all countries most favorable to miners, and, among the crystalline rocks, especially Porphyry (consisting mainly of feldspar) Greenstone, some kinds of Trap, Serpentine, and Granite. For instance, the rich gold and silver ores in Hungary and Transylvania occur exclusively in Greenstone; the rich mines

of galena in the Sierra Morena always occur in the contact between Porphyry and the slate-rock; in Italy, while the stratified Apennines are destitute of ores, there are in the Western Toscana, where Serpentine and Porphyry make their appearance, rich mines of Copper pyrites, Gray Copper, and Hematite in blocks weighing 50 tons. The prospectors in our own Park County should look for such contact-places, which must be abundant there, as Porphyry and other crystalline rocks are in contact with sedimentary formations.

In many cases, the crystalline rocks are covered up by stratified rocks; but, even then, there are infallible indications of their presence. Such indications are the so-called metamorphic rocks. The eruption of plutonic masses has produced remarkable changes in the stratified rocks, sometimes up to a height of some thousands of feet, acting upon them by heat and vapors. In this way, compact or slate rocks have been changed into granular-crystalline rocks; limestones, clay, and sandstones have been impregnated with magnesia, silica, or carbon. Talcose slate, Mica Slate, Quartz slate, Quartzite, Gneiss, Dolomite, Marble, Silicious Limestones, and Black Coal-sands and Limestones are the products of the metamorphic process. These kinds of rock are especial bearers of veins with metallic ores. Numberless examples might be given to show how true guides to the miner are such metamorphic rocks.

Although a connection of the veins with the plutonic rocks cannot be denied, the theory in regard to metallic vapors pervading the fissures from below is in many cases insufficient, and in some not tenable at all. The fissures are frequently shut up in the depth; how, then, could the vapors pervade the masses of Granite or Porphyry

\* Under this head, we propose to publish a consecutive series of papers on Mines and Mining Processes, most of which will have special reference to Colorado. The Series will include articles from numerous qualified contributors.



of an immense thickness? There are slate rocks which contain great masses of ore without showing any visible change in the materials of the strata. There is a very remarkable relation between the richness of ore-veins and certain kinds of rocks. In all European mining districts, it has been experienced that this or that kind of ore appears more frequently and more richly in the vicinity of a certain kind of rock than in that of another kind, although the same fissure may cross the different kinds of rock. Even among the same kinds of rock, where there is a difference of character, a favorable or unfavorable relation between them and the richness of veins crossing them is perceptible. For instance, the celebrated silver-veins of Königsberg cross beds of Gneiss or Mica-slate, and Hornblende-slate; but only where they cut the latter, are they rich in silver, while they are dead in the vicinity of the former. Such facts cannot be explained on the vapor, or steam, or hot stream theories. Why is the ore not found equally distributed through the vein? Why is it richer in contact with certain kinds of rocks? We can allow that metallic matter may have been brought up to the crust of the earth by such means; but it needs to be explained how it has been gathered from the rocks of the crust into the fissures.

The latest theory is that electricity has been the collecting and gathering power.

The whole globe is known as an immense electric machine, with electric currents from West to East. The volcanic activity of the earth, its chemical actions, its heat and light, its rotation around its own axis and around the sun, the capillary power of fluids in the pores and clefts of rocks—all these are causing electrical currents, penetrating all materials in the earth's crust. Now, it is well known that electric currents effect not only chemical actions and crystalline formations—for instance, the artificial production of diamonds,—but also motions carrying materials from one place to another. As an example, when we connect two vessels, half-filled with water, together by a wet thread, and conduct an electric current through the thread, we see one vessel being emptied and the other filled. In a similar manner, the electric currents in the earth,

no matter how weak, may carry away the metallic parts contained in the moist rocks, and deposit them in other places where the currents meet an interruption or a diminution of integrity. The alternate strata of Limestone, Sand, and Clay in the earth's crust act like galvanic columns, while the clefts and fissures, filled with water and mineral solutions, act like conductors between the single pairs of a battery. Thus, in such fissures, the production of metallic ores must go on; and, as the main currents of electricity in the earth are in a direction from West to East, the most numerous and richest metallic deposits must be originated in those chains of mountains or fissures which strike southwards, and, therefore, cut off the western electric currents. In fact, we find that the rich chains of the Ural, of the Andes, of the Rocky Mountains, and of Australia, show that direction.

Not much has been done yet in the investigation of this galvanoplastic process in our earth, but sufficient has been done to demonstrate its future importance for science and practice. The chemist Cross has succeeded in producing an artificial vein; he mixed a mass of clay with the dust of the oxide of a metal, moistened the mixture, and caused a fissure in it by means of a knife; then he conducted a galvanic current through the two halves; the fissure was filled, by and by, with compounds of the metal. The French chemist Sage has, by means of the chemico-electric powers operating in the growth of plants, proved the occurrence of gold in the soil in the vicinity of Paris, showing its presence in the ashes of vines, which had taken up the gold from their nourishing bottom.

Let us now make an examination in the depths of a mine. We are disappointed, having expected to see a mighty vein of Silver-ore, but seeing only seams of it within the thickness of the vein, and finding it much mixed with gangue, the rock which envelopes the ore. We see the ore intersecting the gangue in a continued band, or, more commonly, partly disseminated through it in some places, and continuing for long distances in others. A good vein often gradually loses its character, the metal disappears, and the gangue alone is left; but, by following on for

some distance, it will frequently resume its former character. The gangue usually guiding the miner in metallic veins is quartz, mostly in fine crystals and as Amethyst, Jasper, or other varieties; also calcspar and heavy spar, carbonate of iron, and, less frequently, fluor-spar.

We often observe a remarkable regularity in the structure of veins; we see the gangue and ore in distinct seams parallel each to the other and to the walls; these seams follow the irregularities of the walls in a remarkable manner, and show in the middle of the vein empty little caves with splendid crystals. Even around fragments of the walls which often occur in veins, we find the seams deposited in the same symmetrical manner. Sometimes we observe only two or three different seams, sometimes thirteen and even more. For instance, we find on each side of the vein, next to the wall, a seam of Zinc-blende with Iron pyrites, then follows on both sides a seam of Quartz, then of Galena, then of ruby Silver-ore, and the middle of the vein consists of calc-spar which always shows its crystals turned toward the middle of the vein.

Following the course of the vein we observe, at first, its out-cropping, supposing the fissure has reached the surface. In consequence of the difference in destruction of rocks and gangue, the vein often appears on the surface in the form of a deepened fosse, or of a steeply projecting wall, as is the case in Caribou and the San Juan district. Downwards, the veins do not keep regular in thickness or richness; they are sometimes crossed by other veins, and in such places there is an influence on the richness of the veins not to be mistaken.

Endeavors have been made to distinguish different categories of vein-formations; for instance, in Saxony, four different groups of veins. But it has never been done with clearness, and, if our ideas in regard to the origin of veins are true, never will be done. The prospector has ever to risk his time, the miner will never have a surety in regard to the value of his mine. And it is good that it is so. If the contrary were the case anarchy would be reigning, and mankind fly asunder.

There are some lodes which are no veins, but

deposits of ores parallel to the strata of any sedimentary formation; in this form, iron-ores frequently occur, also copper slate. In the sedimentary formations of limestone and dolomite, there are often found immense pockets of lead and zinc-ores; for instance, in the Karynthian Alps, in Belgium, in Germany, in Wisconsin, Illinois, and Iowa. It is remarkable that the galena of these pockets is generally much poorer in silver than the galena occurring in veins, while the lead pockets in the limestone of our South Park country (Mt. Bross and Mt. Lincoln), and of Utah, are rich, sometimes even very rich, in silver. In no other country, however, are the limestone formations so much surrounded by crystalline (eruptive) rocks as in Colorado and Utah; and the debris between Mt. Lincoln and Fairplay shows, by its quality and quantity, that in former ages the limestone and the crystalline rocks were in more extensive contact than we can observe at the present time.

Big pockets of ore occur also in crystalline rocks; for instance, the magnetic iron of Clinton County, New York, which is celebrated for its purity.

Gold is not only found in veins, but in loose debris and sand along the declivities of mountains. There it is found in the form of nuggets, grains, or leaves, in company with some very rare metals, and with sand of magnetic iron. It is there the Gulch or Placer mining goes on. We know that these deposits must have been derived from veins, but it is not known by what process; the current of the water alone has not done it, for in places where the debris is most angular and edged there is generally the greatest richness in gold.

In this respect also, we see that our knowledge in regard to the geological occurrence of ores is anything but perfect. If the Creator had made as defined a difference as we do between ordinary rocks and the metallic ores which are useful for mankind and which enrich the pockets of individuals, then we could find more outspoken rules in Geology.

RUDOLPH KECK.

## THE MEXICAN BULL-WHACKER.

Of the many sights and scenes in the Southwest that constantly remind the stranger of his proximity to another and entirely different race of people, none is more likely to arrest his attention than that of a Mexican Freighting Team.

The heavily-built wagons, with their enormous loads piled high above the wheels; the thin wiry oxen, with slow swinging gait, dragging them along by means of heavy yokes, which bow down their necks until they are perfect pictures of helplessness and hopelessness; the vociferous and unintelligible ejaculations of the unkempt, ragged, swarthy, and under-sized drivers, as the train moves by, all conspire to make it difficult for the Easterner to realize that he is still within the boundaries of the United States, and not in the very heart of old Mexico.

From five to eight yoke of cattle are generally attached to each wagon, this team being usually driven by a single teamster, who, in the common parlance of the country, is dubbed a "Bull-whacker."

He controls the movements of his lengthy charge by means of a clumsy-looking whip, made up of a very short and very stout handle, and a very long and very heavy lash. When not in use, the handle is generally laid over the shoulder, and the cruel lash drags its slow length along the ground behind. A novice attempting to wield such a whip, succeeds, in most cases, in coiling the lash, like a great serpent, about his neck, and giving himself a stinging blow with its tail across his face; but the professional bull-whacker uses it with the greatest ease and dexterity, and even with an admirable grace. He can switch a fly from one of his oxen so deftly as scarcely to disturb a hair, or he can open a fearful gash in the hide apparently without an effort. To his honor be it said, however, the bull-whacker, despite his name, seldom uses his fearful weapon as an instrument of torture upon his helpless cattle. He makes it bark rather than bite, delighting to swing the huge lash round his head, and crack it with report as loud as those from a rifle; nothing, indeed, more reminds the veteran soldier of a heavy fire along the skirmish

line than the loud and incessant cracking of the bull-whackers' whips, as it is heard, sometimes in the far distance, when one of their trains approaches.

The *personnel* of the average bull-whacker may be picturesque, but is certainly not prepossessing. Garments in which filthiness and raggedness contend for the supremacy adorn his person; the expression of his swarthy face is low and villainous; an unkempt shock of black, wiry hair grows low down on his retreating forehead, and beneath his shaggy brows are two small coal-black eyes ever restless and gleaming.

Yet this degraded bull-whacker, who is a mongrel offspring of the Aztec, the Indian, and the Negro, still boasts of the brave knights who landed with Cortez on the shores of Mexico as his ancestors, and takes unto himself a high-sounding Spanish address that might well have been the pride of any *Cabellero* at the Spanish Court. *Señor* or *Señor don* is invariably prefixed to his address on the letters which he receives; for, strange as it may seem, many of the "greaser" bull-whackers can not only read fluently in Spanish, but write in a very passable hand. Where or how they pick up these accomplishments, Heaven and themselves only know, for in New Mexico, whence they come, the Public School is yet a thing of the future.

And what is that future for the Bull-whacker? His mind seems to be utterly undisturbed by any cravings of ambition, or by any desires for the advancement of himself or his people to a higher place in the ranks of civilization. Like the cattle that he drives, he plods along utterly regardless of what the morrow may bring forth. Wherever night overtakes him, there he unyokes his cattle and turns them loose to graze, and there he makes his "camp." As he squats on the ground, and cooks his uninviting meal, and crouches over the fitful flame of his camp-fire, he presents as abject a picture of human existence as can be imagined. Arriving at his destination after, perhaps, weeks of slow and weary travel, he hastens to those places of resort where he can indulge in the pleasures of dissipation; and, by the

time he has secured another load for his return trip, the resistless charms of *monte*, vile whiskey, and the dark-eyed *sehorita* have decoyed the last dollar from his pocket.

Thus, perchance, in the very track in which Coronado and his brave knights dashed along the Mountains to explore and to conquer, does the ragged bull-whacker, claiming them as his ancestors, shamble by the side of his sluggish oxen, ignorant and unambitious, looking upon the civilization of the new world, as it creeps on and on, but looking upon it, only to step backward and backward as it advances.

For many years, the principal business of the bull-whacker was to transport freight from the Mississippi to Santa Fe and other trading points in the South-west; but the discovery of gold and silver in Colorado opened a new field for his operations, of which he eagerly availed himself. Whenever the transportation of freight by wagon was necessary, whether it were to be merchandise to be carried from Omaha or St. Louis to Denver, or lumber to be hauled down from the Mountains, the bull-whacker was ready for a great share of the work. Even the construction of the

Kansas Pacific Railway, which was destined to shorten his line of operations by many hundreds of miles, was hastened forward in no small degree by the bull-whacker and his Mexican cattle.

After the completion of that road, the crack of the bull-whacker's whip was mostly heard along the base of the Mountains on the road leading from Denver to Pueblo and Santa Fe. But even there, he was called upon to assist in the construction of the Denver and Rio Grande Railway, which, in turn, was to wrest from him the profits of a hundred and twenty miles of freighting, and push back the northern terminus of his business to Pueblo instead of Denver.

Thus, like the driver of the Overland Stage, the bull-whacker is forced further and further from the scenes of his former labors, for, in the shrill voice of the locomotive, each hears and bows to the mandate: "Hitherto shalt thou come, and no further." Still the track goes southward, still the bull-whacker recedes, apparently unconscious of the fact that even his own land will soon be invaded. Going, going, but—whither? *Adios, Sehor.* JUAN.

## OLD INHABITANTS.

Of the many remarkable contributions to Palaeontological science made during the last decade, none are more valuable and interesting than those which have resulted from the devoted labors of Professor Cope. To enumerate his many discoveries would be, in great measure, to rehearse the progress in his branch of science during the period named. His explorations among the cretaceous beds of New Jersey and Kansas have brought to light multitudes of gigantic reptiles more or less resembling the modern alligator, and properly known as *Saurians*. Many of these were of gigantic dimensions, immensely elongated, and the true Sea-serpents of their day. More recently, his investigations among the bone beds of the Tertiary strata have resulted in the discovery of animal forms of a character so remarkable as to place them among the most wonderful yet known. While engaged in the survey of Wyoming as an associate of the U. S. Geological Survey in 1872, he disinterred from the grey

sandstone near Fort Bridger, numerous crania and other remains of a most extraordinary animal of the proboscidian type (that of the elephants) to which he has given the name of *Laxolophodon*. This animal, which no doubt bore a proboscis before him, had also to carry the weight of three pairs of horns, as is proved by the cores yet adhering to his gigantic skull. Two of these horns were attached to the extremity of the muzzle, two were placed upon the frontal bones or thereabouts, and two were apparently an outgrowth from the back part of the head. A full description, both popular and scientific, of this remarkable animal, will be found in the Annual Report of Professor Hayden, of the U. S. Geological Survey for 1872, which has just appeared.

Professor Cope is still engaged in researches among the tertiary "bad lands" of Colorado and adjoining Territories, and the result of his

labors to this date may be found in the following sketch.

The explorations this year, though not yet completed, have been more than usually productive of interesting results. The "bad lands" of Colorado have been discovered to be the graveyard of a long past period, distinct from that of Wyoming, and to contain the osseous remains of a great population of beasts, of totally different species and even orders from those of the latter age and region. They resemble more nearly those of the White River of Nebraska, but many have been obtained by Professor Cope, not known there or elsewhere. So far, he has proven the existence of seventy-five species, some represented by thousands of individuals. Of these, at least forty species are new to science. They range from the size of the mole to nearly that of the elephant; six species only are reptiles.

Several forms of Insectivorous animals, related to the mole, and of very small size, have been procured. The delicacy and minuteness of these fossils is surprising.

Gnawing animals, or Rodents, left numerous remains, of fourteen species, some not larger than the domestic mouse. Some were the predecessors of the rabbits, others of the squirrels, and others of mice.

Of cloven-footed quadrupeds, a great many species have been found. Some were nearly intermediate between the deer and the hog in structure; like the latter they had no horns; they were about as large as sheep. Others were about the size of grey squirrels, being the smallest of this class of animals ever discovered.

Several species of horses were living during the same period, as is proven by the bones and teeth which have been obtained.

Their relatives the *Rhinoceros* abounded in Colorado in former days, no less than seven species having been procured by Professor Cope. One of the specimens is a perfect skull, with teeth complete and covered with the moss-like crystallization seen in the moss-agate.

But the most remarkable monsters of the past, whose existence has been disclosed by the present survey, are a series of horned species related to

the *Rhinoceros*, but possessing some features in which, according to Professor Cope, they resembled the Elephants. They stood high on the legs, and had short feet, but possessed horns in pairs on different parts of the head. One of the largest species had a huge horn over each eye, while another had one on each side of the nose, of more than a foot in length, resembling those on the back part of the head of the ox, etc. A third one, of larger size than the last, had rudimentary horns on the nose. The first-mentioned species has been named by Professor Cope *Mio-basileus ophryas*, and the others have been placed in the genus *Megaceratops*, as new species. Their structure disproves entirely the statement of a recent writer that the presence of horns in pairs is an indication of relationship to the ruminating animals (oxen, etc.) for these beasts are quite near the *Rhinoceros*.

Carnivorous species were not rare in this ancient family, and served, as now, to check the too rapid increase. There were wild cats, dogs, *Hyaenodons*, and the *Tomarctos*, a new genus found by Professor Cope. It resembled a bear, and was as large as the black bear, but was much more carnivorous in its propensities. *Hyaenodons* were as large, and had many flesh teeth; while some of the cats had remarkably long canine, or eye-teeth. In a new species, the size of the panthers, these teeth greatly resembled those of a shark.

The forthcoming reports of Professor Hayden to the Secretary of the Interior, will contain a full account of the discoveries in this interesting department of geological science, made during the progress of the Survey from 1870 to the present time. Professor Cope has obtained from the ancient sea and lake deposits of Kansas, Colorado, Wyoming, Idaho, etc., about three hundred species of vertebrated animals, of which he has made known to science for the first time nearly two hundred. The history of the succession of life on this Continent, as well as that of other regions of the earth, will be much elucidated by the proper investigations of the specimens preserved by the survey. The subject has a special interest with reference to the history of the origin of the human species.

## IRRIGATION AT SALT LAKE.

When the vanguard of the Mormon people passed through Emigration Cañon on the 24th of July, 1847, and looked down upon the valley of the Great Salt Lake—their future home—they beheld an almost utter barrenness, which might well have struck dismay and despair into the stoutest-hearted among them. Immediately before them the ground was hard almost as brick, and bearing nothing but sage-brush and crickets (the latter so plentiful that the Indians fed upon them), and beyond was a wide waste of swamp and alkali land, with nothing of verdure to relieve the desolateness save the green borders of the Jordan River.

That valley, however, was the goal for which they had been aiming, the Promised Land which, according to their prophet, had been appointed unto them; and, three days after their arrival, they set to work to transform the wilderness into a fruitful field. When they tried to plough a little patch, they broke plow after plow in succession in the hard, stony ground; then they turned water upon it, and it became a slough in which their oxen were mired; but they went on laboring and learning—perchance, praying—until to-day they have a city of 25,000 people, almost every house in which is embowered in a grove of fruit trees, whose branches bow beneath their burdens, and—south of their city—a wide stretch of fields and orchards, whose rich fertility rivals that of any section on the face of the earth.

From the work that has thus been done in Salt Lake City and its immediate neighborhood, Colorado ought to be able to learn some valuable lessons, for, in physical characteristics, there is considerable correspondence between much of that part of Colorado which lies along the base of the mountains and that part of Utah immediately under consideration.

Salt Lake City lies directly at the foot of the Wahsatch Range, which runs from North to South, and a small spur from which juts out immediately to the north of the city. The site on which the city stands has, in consequence, a slope from the North and the East. The more

elevated portions of the slopes—known as the "Bench Lands"—have a gravelly soil similar in apparent character to that which prevails so largely in Colorado; the lower lands to the south of the city have partly an "adobe" character and also embrace a considerable proportion of reclaimed alkali land, this reclaimed land being now, for the most part, a rich black loam. In character of soil, therefore, we see a marked correspondence with the soil which Colorado offers to the agriculturist. The altitude of Salt Lake City is 4,300 feet. The mean annual rainfall during the past 23 years has been 20 inches; east of  $113^{\circ}$  W.,—that is in the mountain country east of the city,—it has been 25 inches. The mean temperature during the same period has been: Spring, 51.73; Summer, 75.02; Winter, 32.08; for the year, 53.24. The rainfall at Colorado Springs for the year ending November 30th, 1872, was 28.30 inches. The mean temperature at the same place for the same period was: Winter, 29.84; Spring, 46.78; Summer, 67.29; Autumn, 45.85; for the year, 47.44. The season between frosts at Salt Lake is of about the same length as that in the valley portions of Colorado, and the Winter has similar alternations of severe cold "snaps" (the thermometer, however, not falling so far below zero as in Colorado) and bright sunshiny weather.

It is, of course, impossible, to draw exact parallels; all large areas of country have diversities of character, and especially is that the case in mountainous countries, where there is endless variety in altitude, and consequently in soil, temperature, rainfall, etc., so that what is true of one district cannot be taken as accurate description of another district only a few miles distant. The comparison, however, which we have given shows that there is a general similarity in elevation above sea level, in character of soil, in average rainfall, and in temperature, between the neighborhood of Salt Lake City and many portions of Colorado, sufficient to make the experience gained in the former available, to a large extent, for the latter.

The first noteworthy point is the demonstra-

tion of the fact that the soil lying immediately along the base of the mountains, unpromising as it looks before it is cultivated, is, in reality, as fertile as any that can be found. Those who have been in Colorado for any length of time are fully convinced of that fact; but new-comers are slow to believe it—slow to believe that the dry, red-brown soil, which bears such scant vegetation when left to itself, can be made to yield crops which will put to shame the productions of the soil "back East" where it is "as black as your hat." Salt Lake City and other portions of Utah, however, demonstrate on a large scale what Colorado farmers have also proven on a smaller scale—that this *debris* of the mountains is exceedingly rich in all the elements essential to plant-growth, and produces with a marvelous abundance when properly cultivated. On such soil, the Mormons raise as high as 90 bushels of wheat to the acre; 50 or 60 bushels is a common yield, and the average is probably somewhere about 30. All kinds of grain and grass are grown, and almost all kinds of fruit\* and vegetables, the products of all being exceedingly abundant in quantity and first-rate in quality.

The reclamation of the alkali lands which has been practised by the Mormons with so much success is especially of interest and importance to Colorado. Land near to Salt Lake City, from which in former times the alkali could be shovelled with readiness is now worth \$200 or more per acre, being among the most productive which the Mormons possess. Alkali lands, in fact, are *too* rich, or fat with the very best fertilizers, and all that is needed to make them of great value is to bring them down to a leanness which will make them available for cultivation. The method generally adopted in Utah has been to *leach* the land, levelling it so that water would stand upon it. The mineral matters are thus dissolved and held in solution by the water, and, by throwing off and renewing it from time to time, sufficient of the alkali is removed to leave the land fit for cultivation. Water which will leave a deposit of sand or mud is preferable, and fresh fine sand has been found excellent to spread on and mix with

the soil, as it both warms and weakens the saline lands. Repeated ploughing is also of service, as the soil comes in contact with the gases of the atmosphere, and has been found to lose strength in consequence. In putting in crops, it is recommended to plow immediately before sowing on mineral lands, as the mineral rises to the surface, and plowing turns it under again, and gives the grain or vegetables a chance to grow some size before the mineral forms a crust. A good coating of chaff or partially rotted straw put over the surface the first year will keep the ground moist and prevent crusting. Plentiful irrigation is also valuable for the same purpose. It has been found that castor beans, summer squash, melons, onions, and lucerne (or alfalfa) will grow where there is a considerable portion of mineral; and some Mormon farmers recommend that they should be planted on newly leached lands: castor beans first, and so on in the order named. Fruit trees can be grown well on such lands, by putting sweet fresh soil around the roots and especially around the stock where it comes out of the ground, for if the tree be injured in any way by salt it will be the bark at the surface of the ground. Pear trees will stand almost any amount of salt and grow well. When fruit trees get once rooted in salt land, they become healthy and yield the best quality of fruit. Amongst grasses, red-top has been found to stand alkali well.

In Colorado, we are too ready to regard alkali land as almost, if not absolutely, worthless. We may profitably avail ourselves of the experience of the Mormons in this matter, that experience having shown, as we have said, that such land, when reclaimed, is of the very best quality. The process of reclamation is somewhat tedious, occupying, in some cases, as long as four or five years, but not too tedious to pay, when worthless land can be made to produce two and a half to three tons of hay, or seventy-five to eighty bushels of grain, to the acre.

Next to the soil—for the soil would be of little or no value without it—the Mormons regard their Water as their most precious possession. It is recognized as an important subject for legislation, and its apportionment among the people is regulated with the utmost watchfulness and exactness.

\* We propose to devote a separate article in a subsequent number of OUT WEST to the subject of Fruit Culture by the Mormons.

The Territorial Laws delegate to the Counties the right to control the Irrigating Waters within their limits, and, as a first step, each County is laid off into Water Districts, and Watermasters and Sub-Watermasters appointed to take charge of the water in such districts, acting under the instructions of the County Commissioners. Any one wanting land for cultivation has to apply to the County Surveyor to have the land surveyed. The survey is then submitted to the Commissioners, who consider whether there is a sufficient surplus of water,—after the lands already taken up have had all that they need—to irrigate the land in question. If they decide that there will not, the applicant is unable to obtain any water-rights; if they decide that there is, then the Commissioners approve the survey, and the applicant becomes entitled to his share of water. When there is abundance of water, every man takes it as he needs it, or as he thinks he needs it; but in times when there is a scarcity, the Watermasters apportion it in exact proportion to each man's quantity of land. Thus, if there be five hundred acres under a particular ditch, and crops need watering every ten days, a man who has fifty acres will have the water for twenty-four hours, the man who has twenty-five acres will have it for twelve hours, and so forth; the general plan being to give each man the whole of the water for a period of time corresponding exactly with the area of land he has to water. The Watermasters open and close the gates, which cut off or turn on the supply, and any one tampering with the gates is regarded as a criminal of the highest order. The Watermasters are County Officers, but are paid for their services by the farmers deriving water from the ditches, and they are empowered to demand labor (or its equivalent) from the farmers whenever work is needed upon the ditches. The assessment, which is a *pro rata* one, founded on the quantity of land each farmer has, is usually very small, the Mormons having the faculty of doing most of their work very economically. As a general thing the Irrigating Canals are built by combinations of landholders whose lands will be benefitted, but the Counties sometimes undertake their construction as works of public utility, and the Territorial Legislature has made similar

investments. Salt Lake County, for instance, is now letting contracts for a canal of about 25 miles in length, to run from Utah Lake to the Great Salt Lake. This will cover about six townships, and is estimated to cost about \$50,000. The County has appropriated \$30,000 for the purpose, and the remainder will probably be made up by the sale of water-rights. The *perpetual* water-right from such a canal will be sold for about \$2.50 per acre, the County not seeking to make any direct profit from the enterprise.

It seems to us that in this particular, perhaps more than any other—namely, in the control and regulation of the available Water Supply—Colorado needs to learn of Utah. With us as with them, water is one of the most valuable elements of wealth, (not excepting even the gold and silver), with which Nature has endowed the country, and the utmost economy in its use should be enforced, so that what we have may be made to go as far as possible.

We have, probably, sufficient legislation on the subject, if it were acted up to; but the law is, to a great extent, allowed to remain a dead letter. As the legislative enactments on the subject of Irrigation may not be very generally known, especially among the more recent settlers of Colorado, it may be well to present here the principal of them.

Section 1 of Chapter XLV. of the Revised Statutes of Colorado, provides that all persons who claim, own, or hold a possessory right or title to any land or parcel of land within the boundary of Colorado Territory, when those claims are on the bank, margin, or neighborhood of any stream of water, creek, or river, shall be entitled to the use of the water of the said stream, creek, or river, for the purposes of irrigation, and making said claims available to the full extent of the capacity of the soil, for agricultural purposes.

Section 4 of the same chapter provides that, in case the volume of water in said stream or river shall not be sufficient to supply the continual wants of the entire country through which it passes, then the Probate Judge of the County shall appoint three Commissioners, whose duty it shall be to apportion, in a just and equitable



proportion, a certain amount of said water upon certain or alternate weekly days, to different localities, as they may in their judgment think best for the interest of all parties concerned, and with due regard for the legal rights of all.

Section 9 provides that such Commissioners shall not be appointed until at least six days' previous notice shall have been given to parties in interest, by posting notices of the time and place when and where such appointment will be made, in at least five public places within the region watered by the said stream.

Chapter XLV was subsequently amended for Pueblo County, so as to authorize the appointment of one Commissioner, instead of three, such Commissioner to be a person recommended by the riparian owners along the stream, and only to be appointed on the petition of a majority of such riparian owners.

A local Act for Costilla and Conejos Counties, afterwards extended to Huerfano and Las Animas Counties, provides for the yearly election of a Superintendent for each *acequia madre* (main ditch), to be chosen by the persons occupying the adjoining farming lands. The duties of such superintendents are defined to be to keep the ditches in repair, and to divide the water in such a manner that each and every one will have the amount of water he is entitled to. The superintendents are empowered to call out the persons using water from the *acequia* to contribute their share of work when repairs are necessary. The superintendents to receive such compensation as may be agreed on by the majority of those using the water. This Local Act provides that public *acequias*, during the farming season, shall have preference over all ditches used for any mills or machinery, or any other ditch that may not be used exclusively for farming purposes.

A special act for El Paso County provides that the Commissioners shall be paid \$5.00 each for each day actually employed in the discharge of their duties, and authorizes them to levy a tax within the County upon each person using water for irrigation, in proportion to the amount of water used by each person. The said Commissioners, with a due regard for prior vested rights, shall, from time to time, establish such rules and regulations as in their judgment are necessary

and proper for securing the purposes of the act, and are required to keep in a book devoted to that purpose a correct account of the amount of land each person is authorized to irrigate, and a record of all their rules and regulations for the proper distribution of water. In case of gross neglect of their duties, to the injury of others, they are made liable to the party or parties aggrieved, in double the amount of damages sustained. Anyone using water to which he is not entitled during such time as the Commissioners are controlling it, is made liable to a fine of \$100 for the first offence and of \$300 for each subsequent offence, or to imprisonment for 30 days.

The law as it stands is doubtless capable of improvement, and might well have attention at the coming Session of the Territorial Legislature, so that an Act sufficiently comprehensive to suit all parts of the Territory and yet sufficiently elastic to allow each County to provide for any peculiar circumstances of its own, could be framed.

The provisions of Chapter XLV., however, seem fully sufficient to allow of the appointment of Irrigation Commissioners in every County in which there is agricultural land, and such appointments should be made. As matters are now, we have little knowledge as to the extent of our available Water Supply, and no guarantee that it is used with economy. If we had Commissioners, or one Commissioner, in each Agricultural County, whose special duty it should be to control the Irrigating Waters, a large amount of useful knowledge ought to be gathered together, and a very considerable increase of the area of land now regarded as cultivable ought to be the result. Some of the best farming land in Colorado is, to our knowledge, allowed to lie uncultivated from a fear of want of water, whereas a careful and equitable division of what flows through the country would give sufficient to cover it all.

Touching the much disputed question whether the cultivation of the soil has a tendency to increase the rainfall in a naturally arid country, the experience of the people at Salt Lake seems strongly corroborative of the theory that it does. Some soil which formerly required irrigating several times in the year, now needs no irrigation at all, and other soil needs it

much less than formerly. This, of course, might be expected, even without any increase of rainfall, but old settlers in Utah say that the increase of rainfall is quite noticeable, and the comparative frequency of rain in the Summer time much greater in later than in former years. The presence of the Union Pacific and other railroads has been suggested as the existing cause of this phenomenon. The *Deseret News*, however, says that, without denying that the railroad has exercised an influence in the matter, the effects were observed in Utah before the advent of the railroad. The opinion of the *News* is that "the increased moisture of the Summers of late years is due, firstly, to the hand of Providence, and secondly, to the cultivation of the lands, the building of cities and towns, the planting of trees, shrubs and vegetables. For it is reasonable to suppose that a stirred and irrigated soil, and thousands of acres of trees and shrubs and various kinds of cultivated vegetable crops should give into the atmosphere much more moisture than a hard, dry barren soil." It may be stated here, in order to meet an objection sometimes urged, that the increase of rainfall can scarcely be a *fancied* one; when the Mormons began to build Salt Lake City, they estimated that the creeks running into the district which they had chosen

would water eight hundred acres of land; at the present time their city limits include an area of not less than twenty-five square miles, every part of which is well watered.

We see, then, that cultivation has a two-fold effect: it increases the supply of water for irrigating purposes and at the same time it renders irrigation less needful in after years than at first. It is evident from this that the true policy, when aiming at the irrigation of considerable bodies of land, is to use, to the fullest extent of its availability, the water which is readily obtainable, and expend money in increasing the supply only when experience demonstrates that Nature herself fails to be bountiful. If it can be seen, for example, that there is water enough in a certain district to irrigate 50,000 acres, if used with the utmost economy, let the utmost economy be practised, and it may be that before another 50,000 acres is needed for cultivation, a sufficient increase of the water supply will have been brought about naturally.

There are other points connected with our subject of which we had intended to treat, but our article is already lengthy enough, and a future opportunity may be taken to derive one or two more lessons from the Mormons.

## ON MOUNT LINCOLN.

One of the members of the Hayden expedition, writing to the *New York Tribune*, gives the following description of the view from the summit of Mount Lincoln:

It was a highly favorable time for the view. Not a suspicion of mistiness in all the wide horizon, and the early sunlight brought out sharply the gradations of distance in the West, which a few hours later were comparatively obscured. The sun shone warm, but there blew a fierce, cutting wind, which made us glad, when we could, to crouch in all our wraps behind the pyramid of stones piled about the flag-staff. But the sublimity of the scene long overwhelmed and drowned all other impressions. Such a grand panorama of mountains is to be seen in few other regions of the world—perhaps only in the Himalayas and the Andes. We reckoned with careful

count, and estimated that we had in view more than one hundred peaks which would not fall below 13,000 feet, and at least fifty of 14,000. The two great connected ranges which were most conspicuous were the Sierra Madre to the West, beyond the Arkansas Valley, and the Blue River Range to the North, a continuation of that upon which we were, but bending around westward enough to bring a great line of rugged peaks against the sky. In the Sierra Madre lie two prominent summits, named Yale and Harvard by Prof. J. D. Whitney, in his explorations here four years ago; and the ridge finishes abruptly at the north, with the highest peak of all, estimated by us at 15,000 feet, and named the Holy Cross, from the two immense snow-banks intersecting each other conspicuously on its side, as seen from Gray and Evans, further north than this. The

Spaniards had a Santa Cruz Mountain, doubtless named from the same peculiarity, somewhere in this part of the Rocky Mountains; but, in the absence of maps and of distinct descriptions, it is matter of great question precisely where it was. Rumors of surpassing heights attach themselves to the name of the Holy Cross, and of Sopris Peak; the explorations of this Summer will go far toward settling what is, after all, the highest summit in Colorado, and in the whole United State. As viewed from Gray, Evans, and Lincoln, the palm belongs to two great mountains far beyond the Sierra Madre, and near to one another; one a ride with a hump upon it, and the whole covered with unbroken snow, like an Alp; the other a mass ending in a perfectly conical black peak. By leveling and estimate of distance, we believe those summits to rise above 16,000 feet. We are making off in that direction.

But to return to Mount Lincoln. Almost below it lies the Hoosier Pass, a low ridge across the valley up which we had come, perhaps of moraine origin, separating the affluents of the two great oceans, the Platte leading to the Gulf of Mexico, the Blue to the Gulf of California. Indeed, on the next mountain are head branches of the Platte, the Blue, and the Arkansas, and it has been thence very suitably named *Treaique*. We see the Platte tumbling down the precipice just opposite, out of an always frozen lake. On this side the famous mountains Gray and Evans are hardly conspicuous among a host of their equals; Long's is almost hidden by the narrow ridge. South-eastward, the Park makes a marked and welcome variety in the scene, and beyond it the great isolated mountain of Pike's Peak is very distinct and striking. On the whole, this mountain summit commands points in a region of country nearly or quite 25,000 square miles in extent. No such view is to be obtained in Switzerland, either for reach or for magnificence of the included heights. Yet, of course, one misses the beauty of the pure Alpine mountains, with glaciers streaming down their sides. Here the snow lies abundantly in lines, and banks, and masses, but it absolutely covers nothing. No description can give any idea of such a scene, no drawing or photograph even; although very successful panoramic views have been obtained by the artists of

the Survey, both with the pencil and with camera. Dr. Hayden's expeditions have always been noted for their attention to this part of the work.

I cannot leave Mount Lincoln without a word respecting the lovely Alpine flowers which are found growing in profusion on its heights as well as on all the mountains here, covering with beauty and fragrance the grassy slopes on the rocky declivities, from the timber line to the very summit. A *Polemonium*, with rich bunches of sweet-smelling blue bells, I picked within five feet of the flag-staff at the top of Lincoln, and it is abundant everywhere. Conspicuous among the others are a *Claytonia*, or Spring Beauty, an exquisite deep blue *Myosotis*, or forget-me-not, species of *Phlox* of various colors, etc., etc. Nothing on the plains can vie for rich and delicate beauty with these children of the mountain tops, chilled every night to freezing, and drawing their nourishment from the just melted snow.

COLORADO FOR CONSUMPTIVES.—An eastern newspaper, commenting upon the statements of a correspondent, who is doubtless a chance observer in the Rocky Mountains, concludes that, despite the "glowing descriptions" to the contrary, the climate of Colorado is not so beneficial in lung diseases as other places, for the climate of which no special benefits have ever been claimed. The paper in question bases its conclusion upon the fact, by no means remarkable, that Colorado, and especially "the portions that have been most highly praised," furnish a great many deaths annually from consumption. The deaths from this intractable malady in the Territory for the year 1873 numbered less than twenty. Yet we had in the Territory last year, and still have, we presume, an invalid population of at least a thousand. Many—probably a majority—of these invalids would not now be alive at all had they remained in their eastern homes, where the extremes of heat and cold are very great, and where the humidity of the atmosphere has a most depressing and most pernicious tendency upon those afflicted with pulmonary complaints. It is idle, however to expect that the lives of all the invalids who resort to Colorado can be saved. Very many—probably a majority—do not come until their cases are beyond the hope of permanent relief. All that this climate can do for such invalids is to lengthen their existence by a few months or years. It is well-known, too, that of all diseases that afflict humanity, there is none in which the sufferer is so buoyed up with hope as in this distressing malady, consumption. Hence, we find here, among the multitude who have come with a hope of cure, very many with whom a cure has for months and years been an impossibility, though they seem to have little idea that death is upon them. But leaving aside the "glowing descriptions" to which the journal in question alludes, and coming down to indisputable facts, there is the most overwhelming evidence from actual statistics, not less than from the experience of hundreds and thousands of invalids, that the climate of Colorado is not surpassed, if, indeed, it is anywhere equaled, as a place of resort for consumptives, or persons generally of delicate constitutions.

## MISCELLANEOUS SELECTIONS.

**THE GREAT CANYON OF THE ARKANSAS.**—Imagine yourself standing upon a point of rock, surrounded by the pinon and cedar timber of the country,—a number of eagles circling, screeching and screaming about you, sometimes high in the air and at others away below you, looking down, down, a depth which makes you dizzy, along a rocky wall not smooth and even, but indescribably rough and jagged, studded here and there with pinon and cedar trees which find foothold in the crevices of the rock, to a stream of water, seeming at the great depth like a silver ribbon. Raising your eyes from the scene below and looking about you, you see on every hand an apparently boundless expanse of mountains and valleys, with little parks nestled here and there in the timber-clad hills, presenting a view in marked contrast to that upon which you have just gazed. Looking down the river, far as the eye can reach, you see the rolling plains seeming like a boundless expanse. Such wild and picturesque scenery you never conceived, much less looked upon. You gaze until satisfied and move to another point, perhaps after losing some great rock and sending it thundering and crashing down to the water below, causing the echoes to wake far and near through the great chasm, and an entirely different scene is opened to your view. True, it is of the same character as that upon which you have already looked, but looking from your present stand-point you see many things which were not apparent before. Thus, climbing from rock to rock, the scene presents new forms and you never cease to wonder at the beauty and grand sublimity of the picture spread out before you. You look again and again, and turn regretfully away when the lengthening shadows warn you that it is time for you to retrace your steps. Many people who visit our town fail to look upon this scene, which is compared by one who is familiar with the great waterfall as equal in magnificence and splendor to the Niagara itself.—*Canon City Times.*

**GOING TO THE SHOW.**—The greatest event of the century for the inhabitants of this part of Colorado is John Robinson's show, that exhibited Monday. Nothing like it has been known before. It has brought to our town crowds of Mexicans who were born here, and who, of course, never witnessed anything of the kind. The old settlers, the frontiersmen of other days, also put in an appearance, at this the latest illustration, proving that the days of trapping and trading are gone, and that the accessories of civilization are certainly coming this way. Dick Wooten was here from his home in the Raton mountains, one hundred and eighteen miles away; Charlie Autohees, Zan Hicklin, and other well known pioneers, have put in an appearance from their homes on the Huernano, the Greenhorn, the Apishapa, the Las Animas, and other streams. There were citizens from Santa Fe and other points in New Mexico who had judiciously timed a visit to our metropolis; there were mountain men and sheep men, cattle men and ranchmen from their homes up and down the river. Nor has the enthusiasm and excitement manifested by these people been much less than that of our own citizens who have been deprived of the privilege of beholding a circus and menagerie for terms of two, three, four, five, six, and a dozen years. Called together at the name of John Robinson, all these and many others have gazed and wondered and laughed while the "elephant now goes round," and the clown has told his well-worn jokes, and the acrobats and gymnasts have performed their feats of daring. Take it all in all, no more appreciative audience has looked upon the wonders of the Great Moral Circus and World's Exposition than the majority of those who crowded John Robinson's show.—*Pueblo People.*

**A CHANCE DISCOVERY.**—In 1858, Mr. A. J. Williams—one now one of the leading citizens of Denver—started from Des Moines, Iowa, with three wagons, each drawn by three yoke of cattle, and loaded with Indian and settlers' goods. His destination was the base of Pike's Peak where gold had just been discovered. Williams located first at Fort Lupton, thirty miles east of Denver, but bearing that a settlement was being made at the mouth of Cherry Creek, he moved his teams and goods to that point, where he joined the Russell brothers and General Larimer in laying out a town, and erected the first store in Auraria, now West Denver. Williams, with General Larimer and a few others, soon afterwards crossed Cherry Creek and surveyed and laid out a new town, which they named after the then Governor of Kansas, General Denver. Having entered into mercantile pursuits, Mr. Williams found himself at a loss what to do with his eighteen head of cattle. He had no hay, and grain was out of the question, none being nearer than the station, 600 miles distant. They were too poor for beef, while game of all kinds could be had for the shooting. Williams finally resolved to abandon his cattle to their fate. He accordingly drove them out upon an island in the centre of the Platte, near Fort Lupton, and left them to live or die upon the dry grass which then covered the Platte Valley. Early in the spring Mr. Williams had occasion to visit old Fort Lupton, and curiosity led him to go in search of his cattle to see what had become of them during the long, cold winter months. What was his surprise on landing on the island, to find his cattle, not as he expected, all dead or mere shadows, but as fat and sleek as if fed upon grain all winter. He wondered much at this discovery, and at once caught up his teams and drove them to Denver, where he used them every day during the spring and summer hauling lumber from his mill in the mountains. This was the first discovery made of the fattening properties of the dried grass of Colorado, which covers the plains and hills nine months out of twelve. Although the credit of wintering native cattle in the valleys of Colorado is claimed by and properly belongs to Colonel A. J. Williams, of Denver, Texas cattle had been driven as far north as the Arkansas River and wintered as early as 1847, when Colonel St. Vrain and Colonel William Bent drove several thousand head from New Mexico and wintered them near Bent's fort. Since that, Maxwell and others drove cattle as far northward and established stock ranches on the streams leading out of the Sierra Mojada range, and at the foot of the Hauptollas and upper Las Animas. But it was not until 1866 that a herd of Texas or Mexican cattle was driven north over the "divide" between the Arkansas and South Platte Rivers. During that season, Colonel Williams—who had had never lost sight of the advantage offered by Colorado for cattle raising, drove 1,500 head of Mexican cattle over the "divide." He met with fierce and hostile opposition from the settlers in the valleys south of Denver, but when Williams offered them good cows and calves for one-third the price that they had been used to pay for them, the settlers soon ceased their opposition and themselves became purchasers of Williams' cattle. Since that time a constant stream of Mexican cattle has been pouring into Colorado, so that at this time the number of cattle in Colorado is estimated at from 150,000 to 200,000 head, and at least half of these are natives, or half-breed cattle.—*Correspondence of Inter-Ocean.*

## THE CAPTAIN OF THE COW-BOYS.

I'm Captain Jack of Kurber Creek.  
I wear good clothes and keep 'em sleek,  
On what I buy I ask no "tick",  
For I'm captain among the cowboys.  
I do that work which I think to be, think to be, think to be,  
Consistent with the dignity  
Of a captain among the cow-boys.

Twice a year I corral my cattle,  
And if one turns to give me battle,  
The way I make the fence poles rattle,  
Would draw a smile from a preacher.  
And when I try to rope a calf, rope a calf, rope a calf,  
My perseverance would make you laugh,  
But I mostly catch the creature.

If a visit to Blackjack ranch you pay,  
By way of advice just let me say,  
You'd better not come on branding day  
If beauty is your portion;  
For what with dust and what with blows, what with blows,  
what with blows,

A dirty face and a broken nose,  
Will likely change your notion.

*Pueblo Chieftain.*

**COLORADO FLOUR.**—The crops of Colorado are getting noted for quality as well as size. The wheat is shipped into St. Louis and Chicago, and converted into fancy flour; and the home mills throughout the Territory, about twenty in number, have nearly all of them filled orders for export. The Littleton mills, near Denver, last spring shipped twenty car-loads of flour to Boston and Buffalo. In all the markets of the Territory, Colorado flour is quoted regularly from fifty cents to \$1  $\frac{3}{4}$  100 lbs above the best brands in Illinois or Kansas. The wheat crop of last year is estimated at 950,000 bushels, but one-half of this was exported, leaving a short supply for home consumption, which was made up by the importation of Utah wheat and considerable quantities from the Rio Grande country, in New Mexico.—*Buffalo (N. Y.) Commercial.*

**THE SIZE OF COLORADO.**—Few people have an idea of the size of Colorado. Should you say that Colorado embraces 105,708 square miles, few would gain an idea as to what it means. It would be to many a row of figures meaning something, but what, they hardly know. Even in the Territory there are not many who know what a vast domain is designated by the name of Colorado. That this is true to a great degree in regard to Eastern people is shown by the fact that many believe that Denver is nearly all there is of the Territory. What would be thought of a person who would consider London as being all of England? Yet Colorado is more than twice as large as England, larger by far than England, Scotland and Wales together. You could cut three Irelands out of Colorado and still have enough ground left to build up Wales. Switzerland could be hid in the mountains, being less than one-sixth as large as our Territory. Take out of Colorado as much land as would make six Eastern States and you have a country left as large as Kentucky, with a patch as large as Delaware for a vegetable garden, and a common ten times the size of the District of Columbia. New York, Pennsylvania, Maryland and Rhode Island fall short by over two hundred square miles. Iowa and Kansas miss it by over five hundred square miles. Ohio could be built out of Colorado twice and then there would be a remainder larger than Connecticut and West Virginia. Rhode Island is one eightieth as large as our Territory. Chip off a chunk equal to the New England States, slice off a piece the size of New Jersey, break off a peak equal to Delaware, dump out of the San Juan District a clump of gold as large as Maryland, and there will remain a tract of land larger than Switzerland.—*Rocky Mountain Leader.*

**TREES AND RAINFALL.**—The effect of trees on the rainfall of a country is no longer a question. A peach tree gives off 18 pounds, or about 2 gallons, of moisture every 12 hours. The evaporation from the earth through trees is immense; the roots often draw from springs themselves, and throw off through their branches great volumes of humid air. Especially is this true in Nebraska, where, at the depth of twenty feet, white sand is struck, and this sand is so full of water that, in many places, subterranean streams have been formed, which have been frequently found when boring shafts or wells. The great currents of air which leave the Pacific coast humid and warm empty in snows on the Rocky Mountains, and, leaving the mountains dry, they sweep over the vast plains, finding no moisture to take up until they pass over the Missouri and Mississippi, when, having become again charged, they empty in Illinois and Wisconsin. In Wyoming Territory, the death is almost complete; but in Nebraska the heavily-timbered heads of her streams give some humidity, and the clouds empty in frequent showers along the Loups, Niobrara, Platte, Elkhorn, and Missouri. Those who have watched the effect of forests on rainfall say that, by commencing at the edge of the dry belt, the forests, and consequent rainfalls, may gradually be extended across the whole of the dry belt. So we might commence, say, 200 miles west of Omaha, and, by gradually planting trees westward, increase the humidity of the atmosphere, until the required moisture for rain is reached all over the plains. In Germany the Elbe lost 18 per cent. of its flow in consequence of cutting away the trees along its banks, exposing the water to the hot sun and consequent increased evaporation. The island of Santa Cruz, in the West Indies, which, twenty years ago, was a garden of fertility, is now a desert—the result of cutting away the forests. The theory is this: The dry currents of air are retarded by the forests, and elevated until a point of condensation is reached. Radiation is also prevented, the air cooled, and the clouds passing over the forests are rendered more easily condensed. Electricity is also a great agent, the trees being negatively charged, and drawing with great power the positively-charged clouds. I advance these theories with no hesitating doubts, for they are no longer experiments, but facts—demonstrated by positive experience and knowledge of the laws that govern the atmosphere. Our learned senator Hitchcock, of Nebraska, agrees with me in these views; and it was a conviction that they were correct which led him to frame and have passed this great timber bill, allowing one hundred and sixty acres of the public land to every person who would plant forty acres of trees, and keep them in good order for ten years. The state law of Nebraska also exempts all lands from state taxes for five years when the farmer or owner will plant a few acres of timber on them. It has been shown that tree-planting, as has long been supposed, is neither difficult nor expensive; that the returns, if not immediate, are sure, and the profits very great. From all that has been said, I think every one ought to be convinced that the time has come for us to plant forests; but whether the people are willing to plant them or not, they should be made to do it. All overseers of roads should be made at once to plant trees along the highways at the public expense. Railways also should be compelled by law, not only to fence, but plant trees along the whole of their lines, on either side of the track, and those *vandal fathers* who have robbed their children of the best part of their heritage—the forests of the country—ought to be compelled by law to restore it as fast as possible, by planting new forests to be used for the wants and conveniences of men, if not in their day, after they are dead and gone to clay.

## SUMMARY OF NEWS.

Pueblo is being canvassed for gas consumers. If enough are obtained, gas works will be constructed.

An unusual quantity of oil has been discharged from Canon City surface oil wells into Oil Creek.

The assessment roll for Denver foots up, in round numbers, \$10,000,000.

The internal revenue collected in Colorado during the year ending June 30th, reached \$89,593.55.

A fine brick school house is to be commenced immediately in South Pueblo.

Potatoes are set down as "almost a failure" in the crop report of the Big Thompson Valley.

Grace Greenwood has her residence at Maniton nearly completed. It is delightfully situated.

Work has been begun on the new School House at Colorado Springs.

The Episcopal seminary building at Canon City is growing rapidly.

A Boulder man has just completed a census of the town and finds that it foots up 1,038.

The Fairplay *Sentinel* reports a large number of tourists in that vicinity.

Five years ago the Methodists had only five preachers in Colorado. Now they have forty-eight.

A bank has been instituted in Trinidad by Messrs. Swallow & Terry.

There is a population of one thousand in Silver City, New Mexico.

The Pueblo *People* says that the ditch and the trees in South Pueblo, are something to be proud of.

A tannery in Greeley is doing a large business in curing buffalo robes. They are worth by the bale from \$9 to \$10 each, and cost, green, about \$1.75.

The Episcopal Church building at Colorado Springs will probably be the handsomest church structure west of the Missouri River.

Several hundred new buildings are in course of erection in Denver at the present time. As fast as they are finished others are started.

The Grand Lodge of Freemasons of Colorado will hold its annual communication in Denver, commencing on Tuesday, September 30.

Larimer County bids fair to be a heavy shipper of marble, as large quarries of that valuable material were recently brought to light.

Excellent salt has been discovered in the beds of some lakes, two hundred miles south of Cimmaron, on the prospective line of the Rio Grande Railroad. It is shoveled into wagons.

There is a report in circulation at Del Norte, Saguache County, that the Government is going to vacate Fort Garland and establish an extensive post fifteen miles above the former place, on the Rio Grande.

Mrs. Greatorex is preparing the matter and sketches for a work shortly to be issued by Messrs. Putnam, and to be entitled "Summer Etchings in Colorado." Most of the etchings will be of scenes in the neighborhood of Colorado Springs.

The total valuation of property in Pueblo County is \$3,105,191. The number of acres of improved land in the county is 130,115; and the number of cattle 26,772. Fremont County returns 52,242 acres of improved land; 17,836 head of cattle, and a total valuation of \$1,213,689.

The electors of the South Pueblo School District have instructed the School Board to build a public school house and furnish the same, authorizing an expenditure of \$2,256 for that purpose. The lot on which the building is to be erected was given by the Colorado Central Improvement Company.

The Pueblo *People* says: The town of Las Animas is at present one of the most flourishing in Colorado. Business is increasing, a great many strangers are seen upon the streets, and there is a healthy advance in real estate. The railroad prospects are brightening since the certainty of carrying the bonds has well-nigh assured the completion of the road into the town limits.

Professor Hayden writes that he and his party are in the grandest scenery in the world, and close to two of the highest peaks in the United States, which have been named Capitol and White-house. He says they have named the Great Range on the Upper Arkansas the National Range, as it is the largest in the United States. He says fifty peaks, each one 14,000 feet high, can be seen from where he writes.

A correspondent of the Denver *Tribune* writing from Fort Garland, under date of August 23rd, says: "A definite agreement has been reached by the Utes and the Government, through which the former agree to 'turn over,' at once and forever, all their claims upon the San Juan country—mines, towns, miners, stock and all. Most of the work that secured this happy result—the 'big talks,' smokes, management, manipulations, *et cetera*—has been the conduct of General Charles Adams, the indefatigable and efficient Indian Agent at Los Pinos. He had a valuable assistant in the celebrated Ute Chief—Gunny—who, for an 'Injun,' has about as 'big a heart' as the best even of the Anglo-Saxons. The agreement with the Utes only awaits the arrival of Messrs. Brunot (Commissioner of Indian affairs) and Bishop, from Washington, to be finally consummated and proclaimed."

Bishop Randall was lately in the Indian country, in Wyoming, and had a narrow escape from capture by the savages. On his return to Denver, a *News* reporter called upon the Bishop, who, in the course of the interview, gave utterance to the following opinion upon the course of the government, as regards the settlers and the Indians: "The faith of the government has been pledged to protect these Indians on the reservation, and it is equally in duty bound to protect the citizens who live there. And what are the forces for this purpose? In the reservation is one infantry company, and that not full; forty-six miles away is another company and a company of cavalry having little more than half the requisite number. These are all the forces who are to protect the people and operate against hostile Indians, who ride on fleet horses, who come suddenly, fight desperately, and, having murdered the people or stolen their property, escape rapidly. Such shameful neglect on the part of the government deserves, what we have no doubt it will receive, the just censure of all good citizens."

## MINING INTELLIGENCE.

The "Cold Spring," in Sagar-Lough District, is producing ore worth \$6,000 per ton, and plenty of it at that.

The "Polar Star," on Democrat Mountain, is turning out ore that sells for \$1,300 per ton.

The bullion shipments from Central, for the month of July, through the banks alone, amounted to \$77,500.

Pueblo speaks of Smelting Works to accommodate the ores from Hardscrabble. Fairplay is also asking for smelters.

The Central Register says that the Bohtail Mining Company have been compelled to suspend work, owing to imperfect circulation of air through their smoke-stack.

A pocket of gold specimens was found in the Printer Boy lode, Lake County, last week, worth four thousand dollars.

The "Snowy Range" mining district, eight miles north of Caribou and one thousand feet higher, is attracting the attention of prospectors, rich silver veins having recently been discovered there.

The Pueblo *Chieftain* states that a company has been formed in that city with a capital stock of \$50,000, for the purpose of building a toll road to the San Juan mines.

The "Pelican" at Georgetown, is being worked night and day. The *Miner* reports eighty hands on the active list, and adds that the crevice averages seven feet and the pay streak about a foot.

The Canon City *Times* says that Messrs. I. & D. D. James have decided upon erecting Smelting Works at Rosita, (Hardscrabble District), immediately, and are advertising for four thousand bushels of charcoal per month, to be delivered at the works.

The Printer-Boy Company, in California Gulch, Lake County, with only fifteen stamps, has been extracting about \$3,000 per week. The capacity of the mill is to be increased by the addition of ten stamps.

The gulch miners of Summit County are much discouraged in their mining operations from the want of water. But little rain has fallen among the mountains of that region this summer, and, as a natural consequence, the streams, upon which the miners depend for the principal agent in gold digging, have been too weak for extensive development.

According to the *Mining Review*, the bullion product of Gilpin, Clear Creek, and Boulder counties, during April, May, and June was \$1,062,697.39. The product of the three counties during the half year was \$1,921,823.63. The increase of the second quarter over the first for the three counties was \$203,570.15.

The Black Hawk *Journal* says that the works at the Sierra Madre Tunnel, (of which enterprise we have already given some particulars to our readers), are rapidly approaching completion. The great wheel for supplying the tunnel with fresh air has been finished and is in working order, and everything goes rapidly on.

The Denver *News* says that separation works are now to be erected by Professor Hill at Black Hawk. The works are to be erected on the grounds of the Boston and Colorado Company. Professor Hill finds that he can refine his matte to better advantage, that is to say, less expensively, than to send it either to Germany or England.

Travel to the Del Norte and San Juan mines is greater at present than at any time during the season.

The people of Black Hawk are moving to secure an additional supply of water, as Clear Creek is found insufficient for mining and milling purposes. Mammoth Creek is to be carried down by a ditch and flume, at a cost not to exceed \$14,000.

The Fairplay *Sentinel* has reports from Mosquito, which state that the "Modoc," at twenty feet in depth, is five feet between walls. In the crevice are three or four streaks of mineral that vary from one inch to three inches in width, that have assayed as high as 1,500 ounces per ton. The "Spotted Tail" is also a very promising vein, and carries ore that has yielded, per assay, 1,800 ounces per ton.

A present there are about 500 miners in the San Juan District. They think they have there, says the Pueblo *People*, a silver and gold-producing district second in richness to none in the Territories. The owners of the Little Giant have erected and are operating a small quartz mill. A lot of ore from the Green Mountain lode, which ranks next to the Little Giant in richness, but is a gold-bearing vein, has yielded by careful assay at the rate of \$4,000 per ton. New discoveries are constantly being made.

The Pueblo *Chieftain*, writing of the San Juan District, says: Discoveries have been made 30 miles southeast of Del Norte, of a gold lode 30 to 40 feet in width, said to be equal in richness to the Little Giant. Many very large and fine looking lodes (in this same section) which were thought heretofore to be worthless, are now liable to prove to contain the very richest of ores. Prospectors are reported as having found placer mines about 30 miles north, from which they are taking out some very fine nuggets, one of which was valued at \$116. It was taken out last season. This district was first discovered three years ago.

A correspondent of the Colorado *Agriculturist* says: The depth at which mines "pay" is so various that no estimate can be formed. If the now famous Caribou mine had been commenced one hundred feet further east, it probably would not have even sold for three millions or any other sum. But as it was, the prospectors happened to sink on a "chimney," that is, the part of the mine which came near the surface, or the Caribou-to-day would be in the condition of a thousand deserted holes in the ground that future generations may prove to be good mines, but which the faint-hearted prospector has condemned to unusefulness for a long time to come. It may be that at some great depth the mines of a district concentrate in one great deposit of mineral, but on the surface, the different districts seem to carry different kinds of minerals, or rather the precious metals are carried in different classes of rock and with different associations of minerals. For instance, Caribou, S. W. Sagar Loaf and Williamsburg carry silver almost exclusively, and as depth is attained, sulphurets of silver prevail to a great extent, and in S. W. Sagar Loaf, that richest of all forms of silver prevails almost from the surface, while near Williamsburg galena prevails to a great extent, and as you approach North-Eastern Four Mile Creek and Gold Hill, the telluride ores, rich in gold and silver, become more abundant, but so far as now known, prevalent in but few lodes.



## AGRICULTURE, STOCK AND WOOL GROWING, ETC.

Some 30,000 head of Texas cattle are feeding in Bent County.

The harvest in Colorado is always later than in the States.

This year's crops have suffered on the Huerfano for want of water.

The wheat yield in the region round about Greeley will average near thirty-five bushels to the acre, in spite of the grasshopper raids.

The Colorado Springs Company have offered a number of valuable premiums for the best gardens and farms in and around Town, and the awarders have already made one or two visits of inspection. They are much gratified with the progress which has been made.

It is, says the *Denver Tribune*, becoming more and more evident every day that the section of country adjacent to the Rocky Mountains, is better adapted to dairying purposes than anything else, and it will not be long ere Colorado will be sending her butter and cheese East, instead of bringing it West.

Armijo Brothers, of New Mexico, have a flock of sheep numbering 250,000. They are divided into flocks of 3,000 and herded by a couple of men. The yield of wool is less than a pound and a quarter to the sheep, and still the business is very profitable.

A certificate of incorporation has been filed by the Colorado Live-Stock Company, capital \$300,000. The object of the corporation is the purchase, sale, breeding and rearing of cattle, horses, mules and sheep. The term of corporate existence is fixed at ten years, and the five trustees are, John W. Barron, James H. Jones, Joseph L. Bulver, Thomas G. Putnam, and Alfred Sayre. The office of the company will be in Denver, while pasturage for their stock will be obtained in Douglas and Greenwood counties.

The *Golden Transcript* says: The increase of population in the South Platte Valley will cut off an extensive range heretofore used by owners of Texas cattle, and will add largely to our yield of farm crops. We are every day growing out of this long-horn feeding business, as our lands are becoming too precious to be used as their pasture. Immigration is driving them from the Arkansas Valley, and the South Platte Valley will fail to furnish them with a feeding range by this time next year.

The Fair of the Colorado Industrial Association, successors of the Colorado Territorial Agricultural Society, will be held in Denver from September 30th to October 4th. The committee says: "Arrangements have been made for space at the Chicago Inter-State Industrial Exposition, which will run through the month of October, and all strictly Colorado products on exhibition will, at the close of the fair, with the consent of the owner, be taken to the Chicago Exposition. The great success attending the exhibition of Colorado products made at the St. Louis Fair, in 1876, will, it is hoped, induce every one having good specimens of Colorado's varied industries, to send the same for exhibition, enabling strangers visiting our own fair and visitors at the Chicago Exposition to form some idea of the immense material wealth and resources of our Territory. If one good specimen from each mine and crop in the Territory, be sent to the fair, it will make an exhibition unrivalled in any of the older States."

The Grange movement has traveled as far West as Colorado.

The Big Thompson Ditch Company is a new corporation, and proposes to run an irrigating canal from Greeley to Evans. This canal will cost \$40,000, will be twenty feet wide on the bottom, and will be finished in time for next year's crops.

The committee appointed by the irrigating convention in May, have determined upon Denver as the place for holding the general convention of the representatives from Western States and Territories on the 15th of October. Governor Elbert as chairman, has notified the Governors of the different States and Territories to that effect, at the same time requesting the most earnest cooperation. He has also extended invitations to Seneket Rhine, Senators Morton, Conkling, Wright, and other distinguished men.

The *Denver Times* gives the following as the state of the wool market: The wool market remained quiet with prices easy. Stocks continue meagre, with buyers scarce. In fact, the August dullness was kept up in the East, and the effect was felt here. By our next report we expect to chronicle a firmer market with more buyers on hand. The closing prices were: unwashed Colorado, fine, 13 to 15 cents; coarse, 11 to 13 cents; black, 9 to 11 cents; Colorado, fine selected, 18 to 21 cents; average grade, 16 to 18 cents; Mexican, average grade, 14 to 16 cents; black, 11 to 13 cents.

On another page we make reference to a meeting of the cattle-owners of Huerfano County, at which it was resolved to take steps to prevent the grazing of sheep on the public domain, on the ground that it is detrimental to the interests of the cattle-owners. Subsequently, a meeting of sheep-owners of the same county was held, when it was resolved to resist any such attempts by all legal means in their power; but that the cattle-owners should be invited to meet in convention and appoint a committee to meet a committee from the sheep-owners' convention, so as to agree upon a fair equitable basis of adjustment of the question in dispute.

The *Denver News* gives the following particulars concerning Mr. William A. Rand, of Ralston Creek, whom it puts forward as a specimen Colorado Farmer, and a conspicuous example of what energy and determination will accomplish on our soil: The year 1860 found Mr. R. in Colorado, attracted by the Pike's Peak excitement, and, in the following year, with a capital of less than six hundred dollars, he took up a farming claim in the valley of Ralston Creek. Perhaps, however, the most substantial part of his capital, was brought from Wisconsin in 1862, in the person of a devoted wife, who left the comforts of civilization, like many another, driving a team across the plains, while her husband drove and herded ten cows and calves, which were to help build up a home and a fortune at the base of the Rocky Mountains. Among the results of the labors of the last twelve years are a tract of fifteen hundred acres of fine farming land, nearly in a solid body, all of which will be "under ditch" in less than twelve months; a farm house costing five thousand dollars; twenty-seven dairy cows; nearly a hundred head of stock cattle; six teams,—horses and mules,—together with the usual tools and appliances for farming. Mr. Rand is one of the projectors and part owner of the Golden City and Arapahoe irrigating ditch, that will cover more than twenty thousand acres of land in Jefferson and Arapahoe counties.



## RAILWAY INTELLIGENCE.

Iron is being laid at the rate of a mile and a half per day on the Arkansas Valley Branch of the Kansas Pacific.

Two new engines have been placed on the narrow gauge division of the Colorado Central, and they are working well.

The Trinidad *Enterprise* learns that the Atchison, Topeka & Santa Fe Railway will be graded no further in that direction this season.

The trial trip of the Fairlie Engine on the Denver and Rio Grande Railway, is to be made on an early day in the present month.

Bent County will vote, on the 9th of September, on a proposition to give the Arkansas Valley Railway Company \$100,000 in bonds, provided said railway builds to Las Animas and locates a depot there. The Government has given the right of way to said railway to build across the Fort Lyon reservation to that town.

The earnings of the Denver and Rio Grande Railway (Narrow Gauge) for the month of July amounted to \$39,300.53, being an increase of 37 per cent. over those of July last year; the net earnings were \$19,936.38 being more than 50 per cent. of the gross earnings, and an increase of 94 per cent. over those of the corresponding month last year.

The Denver and Rio Grande Railway Company is receiving a large amount of attention from Eastern newspapers. The fact is generally recognized that its marked success up to the present time demonstrates, beyond doubt, the economic value of the Narrow Gauge, all the theories of Broad-Gauge advocates to the contrary notwithstanding. The *Chicago Railway Review*, commenting on the fact that the net earnings for the month of June, amounted to 54 per cent of the gross receipts, says that such a proportion of net earnings would be deemed extraordinary on the best and longest established standard gauge roads in any part of the country.

**LIFE AT MANITOU.**—You drive on a mile through the garden and cross the foaming Fountain, and presently through the trees you see a long, white hotel. This is Manitou, named from a spring so called, the locality of the celebrated waters. The long verandah is crowded with loiterers, and there is a flutter of femininity upon the rustic bridges and winding paths. Beyond the house there is a huge boulder in the midst of the foaming stream, which serves as a pier for a slender bridge, and also beside it is the most pleasant and beautiful of these famous springs. This is "the fountain which boils," from which the stream takes its name. It is cold, but it seems to be scalding hot. It comes seething up in crystal purity, and you think there ought to be water enough to turn a mill. But the stream which trickles over the edge is small as it falls into the creek below. Even the wanderers over heated pavements are acquainted with its kind well enough. It is soda-water, lacking only the syrup. There was never a harmless thing so noisy as only a tumblerfull of it. It is pleasant to the taste, and the one just beyond it has still another recipe for its mixing, and is unlike it. There are six all told, each differing from the rest in temperature and taste, yet all close together. We are sight-seeing only, and will not enter into medical and chemical dissertations. It is well understood by old drinkers that Saratoga has a formidable rival here, and then that famous watering-place has not the solemn front of Pike's Peak beside it, nor Ute Pass, with its steep walls and deep gorge

and balsamic odors and foaming cascades, behind it. The visitor may think he will find frontiersmen and frontier life here, but he will be in some measure disappointed. The dashing young lady is here, ruining her complexion, kidded and flounced and pommaded, breking a heart now and then among the rocks, and staring at new-comers in the long dining-hall. Dandyism is here, with the painful poble in the same left eye. The broken-down editor is here, fuming around after the mails and daily papers as usual, and gaining rest and redness almost against nature and in spite of himself. You man with the mattoe-chop whickers is John Bull inevitably, and you hear him say to the waiter at tea: "Mush awa milk—aw, wat is that?" The little man with the ugly ventilating hat and an awfully bulbous nose is a Russian, you are told, and a savant. There is the young lady whom you saw yesterday in the deep recesses, and among the pines and feras of Cheyenne Canyon, and as she stood upon a boulder in mid-torrent and looked up, up at the snow-born flood which lay like a floating wall of lace against the rock, you heard her say, listringly, "This is finer than Montmorenci!"—with her white hand against too feet of sheer rock, and a dark pool at her feet, whose foam never knew sunlight.—*New York Tribune*.

**PUEBLO.**—We found Pueblo quite a different town from what we expected. It is one of the oldest places in the Territory, having been settled by the Mexicans, but never began to assume any importance until late years. The population of the place is composed of an adventurous, determined, energetic class of men, hailing from every nationality and clime, and you can hear upon its streets, French, Spanish, German, Mexican, English, pigeon English, Chinese and Ute gutturals; with its population composed of active Americans, sturdy Germans, swarthy Mexicans, embracing among the Americans, both classes in the late war.—Yanks and Rebels—making up a curious whole. The appearance of the buildings is no less peculiar, splendid iron front brick stores that rival Memphis, and the rude adobe buildings commingled; yet, there is a mysterious activity and energy about the people that is wonderful. The appearance of the entire part of Southern Colorado is like desolation to a native of our State, yet there is something in the climate and in the soil that proves such a conclusion false, and that there is no country in the States where people make money so rapidly as here, and where there is greater enterprise.—*Panola Star*.

**ASTRID NOTIONS OF WESTERN SOCIETY.**—It is not a little amusing to hear the oft-repeated apprehensions of uninitiated strangers as to the social status of the West—our city and Territory in particular. We have not infrequently heard, from those who *should* have been better informed, expressions of alarm as to their precious "corporations" during a brief visit to the city. Among their last acts on leaving the States is the purchase of a brace of Colt's navies and at least one of Bowie's brightest blades. A Sharp's carbine further contributes towards the completion of the military outfit, while their trunks and valises fairly groan with multitudinous packages of cartridges and "fixed ammunition." All these bellicose preparations in view of a hurried visit to Denver and the Rockies! Could absurdity further go? We question whether a quieter or more orderly community—one over-aging a higher order of intelligence—or one in which there is less danger to life and limb, to insult or provocation—can be found than here. And the gentry who make walking arsenals of themselves and infernal machines of their luggage, in view of a western trip, only succeed in making themselves ridiculous and in putting themselves to a vast amount of expense and anxiety without rhyme or reason.—*Denver Tribune*.



NEW SERIES.]

OCTOBER, 1873.

[VOL. 1, NO. 4.

# OUT WEST

A MONTHLY MAGAZINE

OF

ORIGINAL AND SELECTED ARTICLES,

BEARING PRINCIPALLY ON THE

ROCKY MOUNTAIN SECTION,

WITH A SUMMARY OF NEWS.

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# PROSPECTUS.

**OUT WEST** aims to be the Magazine of the *Rocky Mountain Section*, and of Colorado especially, as its prominent representative.

Nature has marked out this Section by many peculiarities (geographical, topographical, climatic, etc.,) as a distinct one, and it seems appropriate that it should have a magazine distinctly its own.

For such a publication it will yield abundant topics of interest, for it is a wide field in which to reap, and (to the rest of the world) comparatively an unknown one.

Its physical characteristics alone—its Peaks and Parks and Passes, its Glens and Cañons, its Groves and Forests, its Lakes and Streams and Waterfalls, its Table-lands and its Valleys, its sweeping Plains—might furnish themes for almost endless description.

The researches of topographers, geologists, mineralogists, botanists, and other scientists, are daily unfolding new wonders, the full record of which would require many volumes.

The deeds of daring, the privations and the sufferings of Pioneers in the not far distant Past; the customs and the folklore of the red men who have so long held this vast region for their own, but who are so rapidly disappearing before the on-coming flood of Civilization; the struggles between the old inhabitants and the new; these and kindred subjects can furnish many a thrilling and romantic chapter.

The evidences of an ancient civilization—though scanty as yet—give promise that ere long, the history of a still older race will await the chronicler.

These subjects it is intended shall all find a place, from time to time, in the pages of **OUT WEST**.

The Past, however, must, to a great extent, give way to the Present.

The white man has come to take the place of the red man, and is stamping the super-scription of his kingship on the face of the land. The scream of his locomotive wakes the echoes which a while ago multiplied the war-whoops of the savage. He has turned the fruitful waters upon the Valleys and Plains over which the Indian so lately hunted and fought, and has made their barren wastes to "smile with fields of wavy corn." He has built Churches and Schools and Business Blocks where, but a few years since, the squaws put up the wigwams for their braves. His sheep and cattle are feeding on the range of the antelope and the buffalo. His mining camps are driving the bear and the panther from their lairs in the mountains. And day by day the old order of things is giving place more and more to the new; the Stone has been thrown into the water, and the circles are spreading outwards with continually widening reach.

To present a reflex of this progress of Civilization in its various branches, will be a chief part of our purpose, and to help it forward, to some extent, will not be beyond our ambition.

In brief, it will be sought to make **OUT WEST** such that anyone reading it will gain a full and accurate idea of the Rocky Mountain Section in all its phases—its geography, topography, scenery and climate, its resources, its capabilities, and its wants, its industries and enterprizes, its associations and prospects.

To this end, the Editor has already secured the assistance of several contributors, who are prominently identified with the Rocky Mountain Section, and who are eminently fitted, by experience or study, to furnish contributions of interest and value. He trusts that many others, similarly qualified, will be induced to give their aid, and he commends the enterprize to their good will.

Free use will be made of articles of value appearing in other publications, and these Selected Articles, thus brought together from various sources, will, it is believed, be one of the most valuable features of the Magazine.

A short Summary of News will also be published each month. In this, the aim will not be to present a complete chronicle of events, but rather to give a selection of such items of news as will be a fair index of what is going on.

Whilst **OUT WEST** has been made sufficiently large to afford ample space for these various features, it has been thought well to keep it, for the present, within comparatively narrow limits, it being preferable that it should "grow up with the country" rather than that it should start out on too ambitious a scale, only to afford one more example of the rule that "pride goes before a fall."

J. E. LILLER, Editor.

Terms of Subscription Three Dollars per Annum.

# OUT WEST.

NEW SERIES.]

OCTOBER, 1873.

[Vol. 1, No. 4.

## MEXICO AND THE MEXICANS IN 1872.

NO. 4.—GUADALAJARA AND THE VALLEY OF THE LERMA.

Guadalajara is not only the capital of the State of Jalisco, but the largest and most important city on the Western slope of the Mexican Plateau. Its cathedral, public buildings, and hospitals were finer than any others we met with before reaching the City of Mexico. As we spent five days in the city, and our kind hosts were most able cicerones, we saw nearly everything of interest.

The Cathedral stands on the chief plaza, taking up the whole of one side. It is built entirely of adobe, for fear of earthquakes, which are pretty frequent, and sometimes very severe. Its form is fine; but its appearance is much spoilt by its being painted yellow and blue all over the outside. One of the domes is covered with colored glazed tiles, in patterns, which has a very pretty effect. This way of roofing the domes of churches became more frequent as we got farther east, and in the capital was seen everywhere.

On the other side of the plaza stands the palace, now used for Government offices and barracks; the two remaining sides being occupied by stores, with portales in front of them. These latter are universal throughout the country, and are deep arched piazzas, over the sidewalks. Between the arches stand the cajons, or boxes, where all country goods are sold, and which shut up at night, enclosing not only the articles of sale, but the owners too, who curl up in a space not much larger than an ordinary Saratoga trunk.

Around the city runs the Paseo, a wide drive planted with trees, where, in the afternoon, all Guadalajara rides and drives. It leads to the Alameda, or public park and garden, enclosed within a wall and ditch, with the driving road outside. This is planted with avenues of fine trees, and the walks are bordered by hedges of

roses and oleanders. The Paseo, while we were there, was somewhat spoilt, as all the streets leading to it, except two, were strongly barricaded with well-made adobe fortifications, in case of a sudden attack from the Revolutionists.

We visited the Belen, a very fine hospital near the Alameda; and in the cemetery attached to it saw the curious Mexican method of disposing of the dead. In the wall all round the cemetery are niches in rows one above another, and in each of these niches a coffin is placed, the opening being closed by a slab bearing the name of the occupant. These resting-places are let on lease for five years, and, if the lease is not renewed at the end of the time, the coffin is removed, and the niche let afresh. In the centre of the grounds stands a handsome building, where all the bishops and priests of the city are buried, four avenues of orange trees leading up to it.

A very different visit, and one more pleasurable, though not more interesting, was to the Opera House. When finished, it will be a magnificent building, and will seat 4,000 people. There are five rows of boxes, one above the other, and the original plan was, to make the columns between each box of crystal. Owing, however, to the different political parties at various times appropriating the funds as one or other came into power, the idea of crystal had to be given up, and white marble substituted. "Rigoletto" was very well given the evening we were there, and La Visconti as *Gilda* was charming. Verati and Grossi as the *Duke* and *Rigoletto* were also very good; and the orchestra, under Señor Menesses, a young but most distinguished Mexican composer, excellent. Between the acts, little barefooted, black-eyed Muchachos came round with ices, made from ice from Cuzutlan, about six miles from the city. It is made by putting water

in shallow pits at night and early in the morning a thin sheet of ice is found, made, some say, by "the reverberation of the stars," in other words—rapid evaporation at a high elevation.

But far the most interesting sight in Guadalajara is the Hospicio, founded a hundred years ago by Bishop Juan Cruz Ruis Cabanas. It is so remarkable an institution that I may take space to describe it fully. It stands on a rise in the suburbs across the river at the end of a wide street, and covers nearly eight acres of ground. Some idea may be had of its size from the fact that within the walls are twenty-five separate flower gardens, each with a wide corridor running round it, and outside the rooms. There are seven hundred children in it, from the foundling of a few days old to the young workman of twenty years. Besides the charity children, who are supported, of course, free of expense, there is a collegio where the children of rich parents are educated. All the gentlemen of the Western States send their children there and they receive a first-rate education; their fees, of course, help to keep up the rest of the establishment. We went first into the schools; they have them of three degrees: one for infants from three to six years old, under the Sisters of Charity; the next, also under Sisters, for boys and girls separate, to ground them; and then the third, where the boys about eleven are passed on to a master. In the department of the Niños, the boys were carpentering, tailoring, making shoes, and weaving. Every bit of clothes they wear they make themselves. The kitchen, into which we next passed, was a splendid room with a high domed roof. Two enormous ranges stood out in the middle of the floor, and I found they were from Leamington, England. The girls do all the cooking, and the red tiled floor was so spotlessly clean that you might have eaten your dinner off it with pleasure. Passing the old people's department and infirmary, we went through the girls' school, where they were drawing and embroidering in gold and silver thread, and saying lessons, and came to the "Cuma," or nursery. There we saw thirty little foundlings; one had been found on the doorstep six days before, and was just going to be baptized. There were hardly any Indian children among them, the poor Indios, however

badly off, seldom deserting their children. From the Cuma we went to the music room, Señor Menesses kindly allowing us to be present at one of his lessons. About twenty girls gave us a chorus with solos from the "Elixir d' Amor," and "Semiramide," rendered to perfection. The contralto, a girl of sixteen, had one of the finest voices I have ever heard in Europe or elsewhere for depth, evenness, and quality, and with teaching and age will certainly make herself a name. All the girls when their education is finished, unless they marry, get first-rate situations as governesses or school teachers, and are, as such, sought after. The boys are all brought up and apprenticed to some trade. The Sisters of Charity, who manage the Hospicio, seem to maintain order by a rule of love; every one and everything looked bright and happy. Flowers and birds were to be seen everywhere; and pets of all kinds, from a little brown pig, to dogs and babies, roamed about where they pleased. Altogether, we agreed, on leaving, that in no country, whether old or new, had we ever seen or imagined a more perfect institution.

We left Guadalajara for Queretaro by stage, taking the southern and less used route by Lake Chapala, instead of the usual one by Lagos, Leon, and Guanajuato.

Our first day took us to Ocotlan, a large hacienda two miles from the lake.

We were now fairly in the valley of the Lerma, one of the most important districts in the Republic. This river rises in the Lago de Lerma, outside the Valley of Mexico near Toluca, and runs as far as Lake Chapala, into which it falls at La Barca, under the name of the Rio Lerma. It flows out of the lake on the northern side near Ocotlan; and from thence to San Blas, where it reaches the sea, is called the Rio Grande de Santiago. The valley from Guadalajara to Queretaro, is 235 miles long, and varies in width from 20 to 60 miles, with fine mountains on each side. We roughly computed that it contained about 4,000 square miles, and, if one-half of this were in wheat, with an average of twenty bushels to the acre, it would give, with one crop a year, a yield equal to the present wheat produce of California. An immense amount of wheat is now grown all along the valley, the land being so

rich that, without any dressing, an excellent crop is taken off the same ground year after year. If irrigation were used, two crops might easily be got in the year with proper attention to manuring.

In addition to wheat, barley, rice, garbances (a kind of bean), alfalfa clover for horses, onions, lettuces, cucumbers, chili, and olives, besides many other plants and vegetables, are grown in enormous quantities. Hogs, cattle, sheep, and chickens are raised largely, and we found the following prices current throughout the valley: Chickens, 35 cents each; eggs, per dozen, 9 cents; a fat sheep, \$1.00; wool, per pound, 15 cents.

Leaving Ocotlan, a long and tiring day's journey, from 6 a. m. to 10 p. m., took us to Piedad, a town of 10,000 inhabitants. We crossed the Lerma in a dug-out canoe at La Barca, (8,000 inhabitants), and passed the Hacienda Buena Vista, a very fine estate with a population of 5,000, and Tanguato, population 5,000 also, and about 5 p. m., came to Salitrillo on the Nacimiento Lake. On our left ran a long low hill of volcanic soil, and we were all settling how, in days to come, we would start a great wine-growing Hacienda there, when, to our dismay, we turned right up the said hill and all thoughts of anything but present misery vanished. Never did I feel the equal of that shaking! It was not stones nor skrees, but downright rocks, between which the wheels stuck and the wretched mules stopped, and then came a volley of oaths, blows, and stones, and up we went with a jerk that sent us all flying. Five hundred feet we had to climb up that "Pedrigal," with the chance all the while of an attack from robbers; and down almost as bad a road on the other side.

At Piedad we stopped for a day to rest, and General R. and I explored the town, being followed by a crowd of about forty boys, who insisted on keeping close to our heels though we appealed to their better feelings in our very best Spanish. Don Ignacio, with whom we were staying, apologized for them when we came in, saying that, besides my hat which was an object of great curiosity, they had never seen "una Señorita tan grande," (such a tall lady.) I heartily deplored the fact that the Mexicans are so small.

The following day took us from Piedad, across the Lerma, to Irapuato, (14,000 inhabitants), past Penjamo, a robber town with a population of 6,000, where we got apricots, mulberries, and beautiful flowers. But our breakfast at the same place, in a horrid little fonda or restaurant, was unspeakably nasty, as some of us got nothing but greasy rice, and eggs fried in tallow candle, which, as may be imagined, did not agree with our digestions.

From Irapuato two hours took us to Salamanca (population 10,000) a nice clean town, surrounded by gardens hedged in with organo cactus. Here we had breakfast in a clean hotel, the Patio full of roses and singing birds in cages.

At 5 p. m., after nine hours' traveling, we reached Celaya, the prettiest town we had seen in Mexico. The approach is up a long causeway, with mesquite; pepper trees, and organo on each side the white and tiled towers and domes showing over a thick bank of trees. The plaza is a perfect tropic garden, with a fine white column of canterce, (the excellent building stone of the country) in the centre, surmounted by the National arms. Round the foot of the column is a fountain of water from an artesian well which also supplies "Los delicios Baños termales,"—warm baths opposite the hotel. Celaya has twelve churches, all large and fine, and a population of 15,000.

From Celaya we went to Queretaro. The journey was quite a short one but very tiring, as the road in the valley was deep in mud, and five miles from Queretaro, we had to cross a short Pedrigal. However, by five o'clock we reached the outskirts of the city, so famous now as being the scene of the unfortunate Emperor Maximilian's death.

Just as we were close to the town, one of the party, who was outside the coach, called down as we passed an adobe fortification: "That's where they shot Maximilian." Some of us felt sad; and some had time to get off some fine moral reflections on the vanity of human wishes, etc., etc., when our informant called down from the roof again, "That's the wrong place." So our sympathy had been wasted, and in a humbled frame of mind we drove into the city.

ROSA DEL MONTE.

## THE LEGEND OF FAIRPLAY.

[In our Summary of News, we report the destruction by fire of a great part of Fairplay, the principal town of the South Park. The following legend of the origin of its name, written some months ago, when it was rumored that an attempt was to be made to re-christen it "South Park City," will be of interest at this time. The poem appeared originally in the *Pueblo People*.]

I dun know as they was heros, Bill,  
But I tell you they was game,  
And I can bust  
That feller's crust  
What wants to change the name  
Of the place where them fellers fit that day  
An' give each other such good "Fair play."  
Maybe yer never heard the tale,  
An' maybe as yer don't know  
How it came  
By its en'rus name,  
So I'll tell it to you and Jo—  
I aint much 'count of chinnin' yer see,  
But I'll tell it accordin' to my idee.  
You's both of yer worked in that old gulch,  
An' sweated in that same san,  
An' yer recollects  
That feller "Tex"  
As laid over us shootin' a gun?  
He'd the steadiest hand, an' the clearest eye,  
An' what HE shot at was like to die.  
But a civiler feller never were,  
He never dranked nor howled,  
An' how to vex  
That critter "Tex"  
There's none of us never knowed;  
An' mighty few would have liked to try  
To stand up square to that steady eye.  
He wer'nt no hand at minin', Bill,  
An' he never seemed much to care.  
He paid his way  
From day to day,  
But his heart wer'nt never there,  
For he seemed to be allwus a watchin' the trail  
That them fellers had made as fetched the mail.  
He 'peared to be kinder waitin', see?  
For somethin' as never was done,  
An' all the day  
Nor far away  
He'd keep his favorite gun,  
An' he didn't keep it for none of us,  
'Cause the camp boys kinder took to the cuss.  
One day, I mind it were awful hot,  
So the gulch wer'nt over full,  
"Tex" he spied  
A stranger ride  
Up over the bluff on a mule,  
An' he jumped so quick an' gathered his gun  
That none of us see'd how the thing was done.

They dug a hole for that stranger thar,  
Exactly whar he fell.  
"Tex" went away  
That very day,  
Which way there's none can tell,  
But as he went he was heard to say,  
"That son of a gun has got a FAIRPLAY."

It maybe, Bill, them Eastern chaps  
Would like to change that name—PREHAPS.

He met that stranger full an' fair,  
An' he leveled his rifle true,  
Thar warn't a breath  
T'wixt him an' death  
As the stranger MUST have knew,  
But he never flinched nor turned away  
As he sung out a single word: "Fair-play."  
"Fair play," says "Tex" "you don't deserve,  
For the dirt you have done me;—  
A sister's shame,  
A ruined name  
An' fair play don't agree.  
But I'll give you a chance for your dirty life  
With pistol or gun or howie-knife."  
"I hain't got nothin'," the stranger said  
"To shoot or stab or cut.  
I left my traps  
A mile perhaps,  
Back yonder at that 'ere hut."  
"I promised to give fair play;" says "Tex,"  
"You had better go after your rifle, I 'spects."  
So the stranger rode away on his mule,  
An' "Tex" cum back an' stood  
To see 'em pace  
A forty yard space  
In a clearin' out in the wood,  
An' he told the boys in his quiet way  
How he'd 'greed to give an' take fair play.  
Do you think that stranger sloped? Not he,  
He cum to time all right;  
He were too good grit  
To git up and git  
In the face of a fair square fight.  
There wer'nt no parson nor doctor there,  
They meant business, not pills nor prayer.  
Just forty yards apart they stood,  
Each forty yards from Death;  
Both as cool  
As a Government mule,  
An' both as steady as breath.  
Neither 'an flickered in nary an eye  
Though a moment an' one or both 'ud die.  
Then one of the boys he counted "Two,"  
Then came "Fire!" By G—d!  
A single shot  
The reply he got,  
An' both men down on the sod;  
The stranger bored plumb through the heart  
An' "Tex's" skull leaved 'longside the part.

BEN. BENT.



SHEEP *VERSUS* CATTLE.

The controversy between the Cattle-men and the Sheep-men in Southern Colorado has proceeded from meetings and speeches and resolutions to blows and blood-shed. No one who is interested in the welfare of the Territory can fail to deplore such a spectacle of neighbors at war,—of the two branches of the great Stock interest pitted against each other in an uncompromising struggle. Yet it seems inevitable that, as the Territory fills up, such should be the case. The Sheep-men and Stock-men are bound to jostle each other's shoulders, and then bound to quarrel, because their interests must be at variance each with the other. Experience has demonstrated that Cattle and Sheep cannot co-exist on one range; where the sheep have grazed, the cattle will not feed, even if the mouths and the hoofs of the former should have left anything on the ground for them to feed upon; it is said, indeed, that cattle will scarcely condescend to drink at a watering-place which has been used by a flock. Such being the case, which is to give way? Shall the cattle-man drive off his stock in disgust from the range on which they have grazed in undisturbed contentment for years gone by? Or shall the Flock-master, who has come from other lands to engage in the business which he understands and from which he hopes to derive great profits, magnanimously give up his project, and hasten back to the place from which he came? Clearly neither. The grazing ground is public property, and belongs no more to one than it does to the other; each is as anxious to make use of it as the other; each has as much right to make use of it as the other; consequently, neither is likely to give way, and the strife which has lately been inaugurated will increase in proportions and bitterness as more men are attracted into either business. In fact, even if sheep could be altogether kept out of the country, such a strife must ultimately come to pass among the cattle-men themselves. Agriculture is encroaching more and more upon land which has hitherto been feeding-ground, new men are coming into the Territory almost daily to swell the ranks of the Stock-men, and, before long, under present

arrangements, the herds will come in contact, and disputes for possession must be the order of the day. It may be possible now for our stock-men and sheep-men, if they will exercise mutual forbearance and cherish a disposition towards mutual accommodation, to make a satisfactory division of the land, Lot taking his choice in one section, whilst Abraham seeks another, but this cannot be for long.

The only solution of the difficulty is that suggested by a writer in this magazine two or three months ago; namely, that the law shall enable graziers to acquire an actual and inalienable title to a range for their flocks and herds. Under our present Land Laws, this is impossible. To pay a dollar and a quarter an acre for grazing land, fence it in, and then pay taxes upon it, is out of the question, and would make the business impracticable. But, if certain areas could be designated as grazing land, and could be sold, as such, at rates which the stock-man could afford to pay—say, fifty cents an acre, or whatever, after careful enquiry, was found to be reasonable—we should have an end of controversies and fights. The cattle-man or the sheep-man would then hold his property as the agriculturist does his, and there could be no questioning.

Such an arrangement (which we believe to be unavoidable in the near future) would, of course, to some extent, change the conditions of the business. Stock-men could not purchase, at any price, such extensive ranges as their cattle have been accustomed to take and as they now tenaciously cling to; each owner of flocks and herds would be circumscribed within comparatively narrow limits. This would necessitate the raising of a better quality of stock, the same amount of value being put into a much smaller number of animals; the long-horns must give way to the short-horns. Then, men of very small means would, probably, be deterred from entering into the business, and would have to seek other occupation for their capital and labor. Neither, however, of these necessitated changes would be deplorable. Texan cattle and Mexican sheep have long enough monopolized our grasses, and it is a mat-

ter for congratulation that we are already so far advanced in the era of Durhams and Jerseys and Merinoes. On our Stock Range as well as on our Agricultural Lands, it is to the interest of the whole Territory that every acre should produce the most in quantity and the best in quality that

it is capable of giving to us. And for this end, if for no other, it will be well for us to have men engaged in the stock business, who have, at any rate, moderate capital at command, so that they may be able to conduct it with some amount of spirited and liberal management.

### A LUMP OF COAL.

There are few more remarkable examples of the investigating power of Science than the fact that a lump of coal can be made to tell its own history. Hard, opaque, and black, it looks a very picture of uncommunicativeness; yet, out of its hardness and blackness, the microscope brings forth the full revelation of its strange formation in the long-gone ages.

A glance at a lump of bituminous coal shows that it is nearly cubical in form; closer examination reveals that two of its faces, opposite to each other, lie parallel to defined *bands*, which may be seen running through the piece. These bands are "lines of stratification;" they show the position in which the material forming the coal was originally laid down. The two opposite faces of which we have spoken are fractures which have taken place in two such "lines of stratification;" the four other sides of the lump are fractures which have taken place in "lines of cleavage."

Bearing this in mind, we are prepared to understand the following experiment made by Professor Quekett.

Taking a tiny fragment of coal, he ground one of its faces of stratification smooth, and cemented it to a plate of glass; then he applied the little fragment of coal to the wheel, and cut it down until there remained only a very thin, semi-transparent film, still fastened to the glass plate.

He also treated another fragment of coal from the same lump in a similar manner: cementing it to the glass, however, on one of its faces of cleavage instead of on one of its lines of stratification. Thus, he obtained two cross-sections from the same piece, suitable for microscopic examination.

In one of his cross-sections he found little

coin-shaped bodies, of a yellowish tinge, embedded in a dark substance. These little coins were about one-twentieth of an inch in diameter, and lay with their faces nearly parallel. On one side of each he discovered a little figure, consisting of three straight lines radiating from the centre of the disk, but not quite reaching to its outer edge. In the other cross-section, he saw only thick hoops, the sides of which were pressed together.\*

These little coins or disks he found to be flattened spores, the radiating lines being the expression of three clefts which penetrated one side of the bag.

In favorable specimens, Professor Quekett found that the whole mass of coal was formed of these spores, with the exception of occasional patches of mineral charcoal. In the other specimens he found the sacs passing into charcoal, or hardened and changed until their form could scarcely be recognized. Leaves of trees, and pieces of bark, carbonized and hardened, were found among them, and in some specimens no spores at all were found.

And now, What were the spores of which the coal was found to be so largely composed, and how came they there?

They were the seeds of a club-moss, nearly resembling the now existing *Lycopodium*, a plant which never reaches a greater height than three feet, but which then existed in the species *Lepidodendron*, one of the largest of the carboniferous flora.

If we could imagine one of our own forests, with the *Lepidodendron* and *Sigillaria* taking the place of the oak and maple, growing luxuriantly upon a clay soil, we should have a very fair

\* See a paper by Professor Huxley in the *Contemporary Review*, volume for 1871.

representation of a wood of the Carboniferous period.

Growing in swamps (for we find the remains of land-snails, gally-worms, and salamander-like creatures) these forests of gigantic club-mosses, tree-ferns, and mares'-tails, were rank in verdure, developing seeds and spores freely, and, as the seasons changed, raining them copiously upon the ground. Their fallen trunks became, as now in the Tropics, nests for snails and worms, that ate up the decaying wood, and left the hollow trunk to be filled with spores, or they sank by their own weight into the soft ground.

Then the whole mass of accumulated spores, bark, and decaying wood decomposed, and lost all but its carbon and a small quantity of hydrocarbons. After a time, it was covered by the advancing waters of a fresh-water lake, and by the alternate layers of sands and clays that formed at its bottom. Then, again, the lake receded; other forests flourished; other beds of carboniferous matter were formed; and the process was repeated, time after time, until Nature changed—the great change which announced the Mesozoic Age, when Continents were lost and found, when species were swept away, when the age of magnificent flora yielded to the age of reptiles.

Thus were formed the strata of carboniferous matter, of clays and sands, which we now recognize, in their hardened condition, as belonging to the Carboniferous age.

The description, however, scarcely applies, in full extent, to our coals of Colorado; *they* were formed in a later age. A discussion is now being carried on as to whether they are of the Cretaceous or the Tertiary age. Be that as it may, enough is known to enable us to say with some certainty of what they were composed.

The forests then were as forests in temperate regions are now—beech, poplar, oak, and the like; the same undergrowth as now; the same climate; the same winged bugs; no spore plants that we know of. All this we learn from the fossils; and the coal itself shows it. Fibrous; brown when cut; the same under the microscope as without it—it shows its woody origin.

And this is all the difference between the coal of Colorado and the coals of the Carboniferous age. The trees grew, as then, upon beds of clay;

the lakes swept over the forests, leaving behind them, as they receded, strata of clay and sand; then other forests started; and so, except in climate (for instead of the foliage of the tropics, the foliage of the Temperate zone existed) Nature repeated herself.

Have you ever noticed the rosin in our Colorado coals, a little yellow gem in a black setting? How did it come there? Oaks and the like are not resinous, but every bud of our cottonwood trees is covered in Winter by rosin as a protection from the cold. So small a fact has left its handwriting upon the rocks.

Whether, then, discussing Carboniferous, or Cretaceous (or Tertiary) coals, we have arrived at the period when seams of carbonaceous matter lay between alternating seams of clays and sands. We come next to the processes by which they were hardened as we now find them.

These loose materials were hardened into rocks by the slow pressure Nature has always at her command.

During the bye-gone ages, as always, the interior of the earth was contracting faster than the outer cooler, and, therefore, harder crust. Thus a space was formed below the crust. When the time came that the crust could no longer bear its own weight, it sank in its weaker places, and hills and valleys were formed. The crust contracted, as it were, to fill the vacant space and to gain support. This contraction produced pressure, and the particles of the mass were welded together; the pressure also produced heat and the metamorphism was completed.

Among all the questions of Dynamical Geology, this change of level or the contracting of the earth's surface is the hardest to understand; let us then illustrate it by a homely example. An apple laid in a dry and warm place wilts; in other words, the meat of the apple contracts, the skin shrivels. In somewhat like manner, the interior of the earth is always contracting, the outer crust shrivelling.

Sometimes, in addition to such regular changing of levels, a great disturbance takes place, when, perhaps, the whole earth is changed. So it was at the end of the Carboniferous age when the Mesozoic was ushered in.

The heat gradually produced by the pressure of particles when the shrivelling of the crust took place, must have been enormous in the aggregate. In a recent lecture upon spectroscopy by Professor C. A. Young, it was mentioned that, if the sun were to shrink but two hundred and forty feet in diameter, (or twenty-seven millionths of one per centum of its diameter) a year, there would be produced as large an amount of heat as is now given off from it; so great is the amount of heat that is caused by the pressure of particles.

We do not say that this was always the only

cause of the metamorphism. Other causes may have assisted. The writer believes, for example, that a trap dyke that is found underlying the coal beds in Fremont County, had much to do with the hardness of the coal there. But such cases are rare. Usually the greater the changes of level, the harder becomes the coal. A section through the anthracite region of Eastern Pennsylvania, gives an unending letter S from edge of coal to edge of coal, while the bituminous beds of Western Pennsylvania roll in slight undulations only.

R. NELSON CLARK.

### SHEEP-RAISING IN NEW MEXICO.

Unlike most of the Territories, New Mexico can boast of a civilized population that dates back its beginning, not by decades, but by centuries. Its Indian tribes—the Pueblos, Pimas, Papajos, etc.—are the most civilized Indians that are to be found on the American Continent, living in villages and engaging in numerous industries. Its "Mexican" population claim descent from the noble Spaniards, and, in many families, trace back the descent in an unbroken line. Hence, though New Mexico has, thus far, received but little of the immigration which is so rapidly filling the West, it has its cities and villages, farms and vineyards, flocks and herds—all the evidences and outgrowths, in short, of a primitive civilization.

Sheep-raising has long been prominent among the industries of the Territory, and has been engaged in on a scale scarcely paralleled elsewhere. Until the location of the Navajos, Comanches, and Apaches upon reservations, it was carried on under serious disadvantages, thousands of sheep being driven off by these hostile marauders at a time; but, of late years, the sheep-raisers have been enabled to carry on their business in comparative peace.

As years have gone by, the flocks have increased in numbers, until some of the flock-masters count their sheep by tens of thousands, and are enormously rich. Such are the Pereas, Bacas, Oteros, Armijos, and others. It is said for instance, that last year Mariano Yrisari, probably

the most wealthy man in New Mexico, sold 100,000 pounds of wool, for which he received forty-one cents per pound, and that his total income from his flock during the year amounted to fully \$100,000.

It is, however, only of late years, that the business has yielded such large returns as it is now doing, for, up to 1858 or thereabouts, no use (beyond a trifling local manufacture from it) was made of the wool, difficulty of transportation to the Eastern market rendering it almost impracticable to send it thither. Previous to that, therefore, the profits were derived from the sale of mutton alone, and large numbers of sheep were driven across to California, where, at one time, sheep fetched as high as \$18.00 per head. Denver is now the great mutton market, the flocks being driven up there, and being sold to dealers, who take them to Wyoming, Montana, Idaho, etc. A considerable quantity of mutton also goes to Arizona.

In addition to the sale of sheep for mutton, the New Mexican flock-masters supply large numbers to form the basis of new flocks which are being continually established in Colorado and in other sections, the "Mexican" ewes being almost universally purchased for that purpose, in consequence of their low price and the fact that they have to undergo no acclimation.

About 1858, the shipment of wool eastward commenced, it being carried by wagons to Independence, Missouri, and subsequently to Kan-

sas City. As the Kansas Pacific Railway was pushed westward over the Plains, one station after another gained and lost the trade, and now the points to which it is freighted are Pueblo, Kit Carson, and Grenada, (the last a new town which has grown up at the end of the track of the Atchison, Topeka and Santa Fé Railroad). Thence it is shipped East, chiefly to Philadelphia and Boston, where a ready sale can always be depended upon.

This opening up of a market for the wool and the constant increase in the demand for sheep, both for mutton and stock purposes, has, of course, given great encouragement to the business, and caused it to receive much more attention than formerly. But the greatest impulse has been caused by an appreciation of the enormously increased profits to be derived from the introduction of pure Merino bucks.

The "Mexican" sheep, however useful they may be in their way, are but miserable apologies for sheep, as may be judged from the facts that they sell for from \$2.00 to \$3.00 per head, and shear about a couple of pounds of wool per fleece. But they are the degenerate descendants of noble ancestors, like some of the other dwellers in the country, and the good blood, when it gets a fair chance, speedily re-asserts itself. The Mexican sheep are, in fact, pure Merinoes deteriorated through in-and-in breeding, consequent upon the difficulty, which has heretofore existed, of introducing new blood. That this is the case, is manifest from the fact that the deterioration can be traced from the Gulf of Mexico, westward and northward, in exact correspondence with the distance from the coast and, in consequence, with the difficulty of introducing new blood. In the State of Vera Cruz, bordering the Gulf, the merino is found almost pure, in the State of Mexico somewhat less so, in Zacatecas still less, and so on, through Sonora and Chihuahua, to New Mexico, where, so far as appearance goes, almost all trace of the original is lost. But, as we have said, the good blood is there, and re-asserts itself as soon as it is encouraged. The first cross with a pure Merino buck gives a lamb, which, when grown, will shear more than twice as much as its dam, and the wool from which will sell for about double the price per pound.

Here, therefore, is the means of at once securing quadrupled profits, and the realization of this fact, as might be expected, is opening the eyes of the New Mexican sheep-men to the almost marvelous returns which they may derive from their business.

In order that the uninitiated may be able to form ideas for themselves on this point, a sketch of the manner in which the business is now carried on, and some few figures on which to base calculations, will be necessary.

Where the flock is large, it is customary to divide it into bands of two or three thousand each, and these bands are put into the charge of herders—two to a band—who follow or drive them from place to place according to the quality of the grass and the supply of water. The flocks graze on the public lands, and frequently range over very large areas, bands belonging to one flock being sometimes two or three hundred miles apart. They feed, all the year round, on the wild grasses—principally gramma and mesquite—which flourish abundantly in Summer and are cured into natural hay in the Fall, affording a nourishing supply for the Winter. The only outlay, therefore, except in the lambing and shearing seasons, is for herding, and that, owing to the cheapness of labor in the Territory, is very light. Ordinary herders are paid \$10 to \$15 per month, with board, the "board" consisting of a little corn and a little ammunition. The corn they bake and grind and make into a kind of mush, named "atole," which is very satisfying and nourishing; and with the ammunition they shoot plenty of game to satisfy all their cravings for meat. The herders are generally quondam "peons," accustomed to obedience and with few wants, and as a rule, they render very faithful service. At lambing-time, extra help is engaged, about a dozen herders being then employed to take charge of such a band as we are speaking of; they are employed for about a month. The increase in lambs is estimated at about 100 per cent. on the flock. Two shearings—in May and October—are now generally made in the year; formerly only one shearing per annum was the rule. At shearing-time, most of the flocks are driven to central points, where the wool-dealers are in attendance to make their

purchases; for instance, on the east side of the Rio Grande, large numbers of the flocks are driven to Antonchihó, and on the west side of the river to Atrisco. The shearers are paid about \$2.50 per day, being 2 to 2½ cents per fleece, as a good shearer will shear 150 common fleeces in a day. The fleeces, it is to be borne in mind, are light, averaging two to three pounds, worth, in ordinary years, about 20 cents per pound on the ground. First-cross sheep shear five to eight pounds, worth about 35 cents per pound.

Mexican ewes are now worth from \$2.50 to \$3.00 per head; merino bucks may be bought in Denver for about \$30 per head; fourteen bucks to a thousand ewes is regarded as a good proportion.

With these facts and figures, we are now in a position to make a calculation.

Let us take this month of October as the starting-time. All things considered, it is probably the best time for a man to enter upon the business, although ewes are dearer then than at other seasons. Some previous preparations are of course necessary, which would be likely to occupy a month or two, so that a beginning might actually be said to be made in August, though the sheep might not be purchased until October. We will base the calculation upon a flock of a thousand ewes, that being about as small a number as a man should begin with. For the first year we get the following outlay:

1000 ewes at \$3.00 per head,	\$3,000
14 Merino Bucks at \$30.00 per head,	420
Wages of two herders, 12 months at \$15.00 each, per month,	360
Wages of four extra herders, at lambing-time,	60
Cost of shearing, 3,000 fleeces at 2½ cents per fleece	75
Food and ammunition furnished to herders,	75
Total,	\$3,990

On the other side of the account we have the following:

2000 fleeces from the ewes, (two shearings), 2 lbs per fleece—4000 lbs,	800
1000 fleeces from the lambs, 3 lbs per fleece, (being graded lambs)—3000 lbs, at 30 cents,	900
14 fleeces from the bucks, 14 lbs per fleece,—196 pounds at 40 cents,	78
1000 first cross lambs, worth, say, \$4.00 per head,	4,000
Total,	\$5,778

There would thus be for the first year the sum of \$1,778 in available cash, and a thousand lambs, the actual value of which it is difficult to determine, as such lambs rarely find their way to market, but which could scarcely be worth less than the sum we have put down—\$4.00 per head.

In the second year, we shall over-estimate if we put the expenses of herding and shearing at double those of the first year, but to do so will simplify matters.

#### OUTLAY.

Expenses of herding and shearing,	\$570
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#### RETURNS.

2000 fleeces, as before, from the ewes,	800
2000 fleeces from the first year's lambs, 10 lbs per fleece—20,000 lbs, at 30 cents per lb,	6,000
1000 fleeces from the second year's lambs,	900
14 fleeces from the bucks,	78
1000 lambs,	4,000
Total,	\$11,778

Should the lambs of the first year be used for breeding, the return would be still larger, but prudent Flock-masters would forego the present gain for the sake of the future. At the end of the second year, additional bucks would have to be purchased, but the outlay (\$420) can scarcely be debited to that year's expenses.

Each succeeding year would show a still more marvelous profit, the returns assuming a continually increasing ratio of progression.

Allowing the widest margin for casualties and drawbacks of one kind or other, it will be seen that sheep-raising in New Mexico, if we are to accept the statements of those who are actually engaged in it, offers a field for investment, wherein the man of small capital will have better chances of speedily becoming a millionaire than in any other which can be found.

**BOILING POINT.**—Away up here, 10,000 feet high, where the atmosphere is so light that the boiling point is far below 212°, as at the level of the sea, cooking some kinds of vegetables becomes a serious matter, if required to be done in a hurry. When the weather is clear, it requires an hour of rapid boiling to soften even quite ordinary-sized potatoes. If beans are well soaked in advance, ten hours' boiling will make them eatable. *Moral.*—Don't try to boil beans for breakfast, especially if you get up late and are in a hurry to reach business.—*Correspondence Rural New Yorker.*

## HIGH AND DRY.

Colorado is emphatically "high and dry."

Hersnowy peaks rise, many of them, to a height of over 14,000 feet above the sea; the parks and valleys scattered through the mountain system have an elevation of over 8,000 to 10,000 feet; the "plains" range from 4,000 to 6,000 feet. The altitude of Pueblo, one of the lowest of the principal towns in the Territory, is 4,617 feet; of Denver, 5,275; of Cañon City, 5,443; of Colorado Springs, 5,943; of Georgetown, 8,245; of Central City, 8,343; of Hamilton, 9,943; of Fairplay, 10,040. The Summit of the Sangre de Cristo Pass is 9,210; of Hoosier's Pass, 11,025; of Breckinridge Pass, 11,240; of Berthoud's Pass, 11,816.

This great elevation and the long distance from the sea, produce a remarkable dryness of the atmosphere, and a very small rainfall. One or two of the results of this remarkable dryness of the atmosphere we propose to note in the present article.

One of the most manifest results, and one to which many noteworthy phenomena are referable, is an extreme clearness of the air, the lack of moisture rendering it almost perfectly transparent. The scope of vision is consequently greatly enlarged, so that, from some favorable points, the eye can take in a mountain view of full three hundred miles in extent—peak upon peak, range after range, an almost boundless panorama. Probably nowhere else on the face of the earth is such a view possible.

To the unaccustomed eye, this clearness of the air renders the ideas of distance very deceptive, everything seeming to be much nearer than it actually is. This is illustrated in the experience of the early explorers. When Pike first caught sight of the peak which now bears his name, he imagined that a day's journey would take him to its base; but he found that he was really three day's journey from it. Scarcely a stranger comes into the Territory who does not fall into similar error; and many are the travelers who set forth from Denver to take a walk to the mountains and back "before breakfast," little dreaming that the

trip is a good day's work. Mountains which are ten or fifteen miles away appear oftentimes as though they were only two or three miles distant, every crag and boulder upon them standing out with sharp distinctness.

As a consequence of the incorrect ideas of distance thus conveyed, it is usual for strangers also to form very inadequate ideas as to the height and bulk of the mountains, and many are, at first, disappointed in their appearance; it is difficult to realize that a peak whose summit stands out so clear and distinct that every little inequality in its outline can be followed by the eye, is over fourteen thousand feet in height. Experience, it is true, soon corrects the first impressions, and the eye insensibly becomes able to estimate distances more justly, and to give the full value to altitude and bulk. It is to be borne in mind, however, that a Rocky Mountain peak of 14,000 feet can never cause such an impression of towering height as an Alp of the same elevation, the beholder on the Rocky Mountain Plateau having his standpoint at an elevation of from 4,000 to 6,000 feet, which is to be deducted from the visible height of the mountain, whereas in Switzerland, his standpoint will not be at an elevation of more than 1,000 to 2,000 feet. Another marked difference between the mountains of Colorado and those of Switzerland may also be noted here. In consequence of the much drier atmosphere in Colorado, and of other climatic peculiarities, there are few of the mountains which retain snow, except upon their very summits, during the whole year; hence, the vast snow-fields and glaciers which characterize Alpine scenery are almost altogether lacking in the Rocky Mountains. In place of virgin white and sombre gloom are rich colors lighted up by brilliant and almost continual sunshine.

For another effect of the clearness of the air is manifest in the undimmed splendor of the sunshine. As a rule, the skies are cloudless, and the sun's rays pierce through the atmosphere with little obstruction. This constitutes one of the greatest charms of Colorado's climate; few can resist its cheering effects. The whole air seems

to be filled with the life-giving brightness, and all Nature seems to rejoice in it.

When the clouds do gather, as is generally the case about the time the sun goes down, the effect is very beautiful, and few grander spectacles can be looked upon than a sunset over the mountains. To describe these Colorado sunsets, one should have the pen of Ruskin, with its accuracy of portrayal, its minuteness of detail, and, withal, its poetic power, for who can picture the thousand varieties of cloud-form, the many hues, brilliant or delicate, the lights and shadows, that go to make up any one of them? At times, vast masses of cloud glow in the beams of the setting sun as though they were one vast sheet of flame, then, as the light fades, die out into the cold whiteness of ashes; at times, some colossal mountain of vapor hangs over the more material mountains below, thick and heavy as a pall, but its edges dazzling in their golden splendor; at times long lines of delicate dappled clouds float in the blue-green sea of the Western sky, changing with the changing light, through all the gradations of the most lovely grey. And, beneath all, are the immovable mountains, invested with a new glory, their outlines and their details softened, and veiled with the most exquisite blue and purple, whilst long shafts of gold are shot athwart their rugged crests.

Mock sunsets are not unfrequent, and present another curious phenomenon referable to the clearness of the air. It is often the case that, just before the sun goes down, the clouds gather round the whole horizon, and form an encircling belt of gorgeous color. The coloring in the East is sometimes quite as brilliant as in the West. This alone, if one were unacquainted with the points of the compass, would make it doubtful where the sun was actually setting; but, occasionally, the reflection of the sunset (if we may so term it) is rendered still more true to the original, by the visible radiation of light which is so common in the West when the sun goes down. The explanation of the phenomenon is to be found in the fact that the shadows of the clouds above the setting sun, are extended clear over to the eastern horizon, where they centre in one point, just as they start from one point; overhead, they are scarcely distinguishable, but on

the horizon, where they come to a focus, and where the clouds cluster, they are clearly discernible.

The moonlight, like the sunlight, is exceedingly brilliant, as may be gathered from the fact that lunar rainbows, though rare, are of much more frequent occurrence than in other regions.

All the usual heavenly phenomenon, in short, are intensified in the Rocky Mountain section: the blue of the sky a deeper blue, the sunshine clearer and more penetrating, the fleecy clouds are whiter, the many-hued rainbows more rich in color, the sunsets more exquisitely beautiful, the storm-clouds angrier, the lightning's flash more brilliant.

The gathering and the breaking-up of the storms present endless variety of effect. Suddenly, and with little premonition, the great clouds begin to accumulate in the sky, like a vast host mustering at some hurried bugle-call, and one is then reminded of the saying of an old Coloradan: "We make clouds here for all the universe." Perhaps they stretch themselves along the mountains, dropping into the deep ravines, and throwing forward the ridges of the foot-hills behind which they droop; or they circle round the summit of some loftier peak, enfolding half its height in their blue-gray shroud; or they spread themselves in front of all, blotting out the whole of the range; or they extend over the whole sky, in a thick, leaden-hued sheet. Just as suddenly do they disappear, when they have discharged their burden. The wide-spread sheet breaks up into distinct masses, which are speedily absorbed by the ever-thirsty atmosphere, and soon not a trace remains in the cloudless sky. Anything more exquisitely beautiful can scarcely be imagined, than such a breaking-up of a storm on a moonlight night. At such a time, the long masses of cloud, filled to overflowing with the soft light, hang in the hollows of the mountains like huge fleeces suspended from above, or the mountain masses rise through them like the backs of some vast ocean-monsters through a sea of foam.

Several peculiarities of temperature are traceable to the dryness of the air. Dry air is a non-conductor; hence there is very little diffusion of the heat derived from the sun's rays. As a consequence, there is a very marked difference in



temperature between sunshine and shade—much greater than is the case in more humid sections. A striking example of this is always afforded after a fall of snow. A few hours suffice to dissipate and absorb the snow wherever the direct sunshine strikes it; but, in shadow, it will remain upon the ground for several days, and the line between the two is defined with the utmost sharpness: the shadow of the rails of a fence, for instance, manifests itself upon the ground in sharp-cut bands of snow. Thermometrical readings, therefore, being almost always taken in the shade, are not nearly so accurate an index of the actual temperature in Colorado as they are in most countries. One morning last winter, when the thermometer registered eight degrees below zero, we saw a lady strolling quietly along, without either bonnet or shawl, and she evidently felt no serious inconvenience from the cold; the thermometer was in the shade, the lady was in the sunshine. Similarly, in summer time, however hot it may be in the full blaze of the sun, people may always keep cool by choosing the

"shady side." Cool nights are the rule, and, as a consequence, refreshing sleep generally falls to the lot of those who live in the Territory. The change of temperature is apparent immediately that the sun goes down, the thermometer frequently falling at the rate of about a degree a minute. This fact should be borne in mind, and carefully provided for, by invalids. The safest course for such is to take care to be indoors before sunset; otherwise, there should be plenty of provision, in the way of clothing, to make up for the difference in temperature.

It is beyond our purpose in this article to treat of the curative effects of the dry air. It is now well known in most parts of the world that for consumption, asthma, and other diseases of the throat and lungs, the climate of Colorado is exceedingly beneficial. The *rationale* of this it falls more within the province of the physician than of a lay writer to explain, but it may all be ultimately summed up in the statement that Colorado is "high and dry."

SOAP-WEED.

## BISHOP RANDALL.

Among the promised contributors to the pages of *OUT WEST*, was Bishop Randall, and it was his intention, expressed in a recent letter, to have prepared a contribution for the number which we are now sending to press. In place of that contribution, it becomes our sad duty to publish his obituary.

He had recently returned from an episcopal visitation to the southern part of Wyoming. Shortly after his return, he was stricken with fever, the disease having doubtless been induced by the fatigue and the excitement of the journey, for, in addition to long travel in stages and wagons, he had a very narrow escape from hostile Indians who were raiding in the district which he visited, and who committed several murders whilst he was there. The fever quickly assumed a dangerous character, and serious apprehensions were felt that the end of the Bishop's life and labors was near; but a favorable change renewed hope, and, as the improvement continued, it was

thought that the danger was past. A relapse, however, occurred, and a little after noon on Sunday, September 28th, Bishop Randall passed away.

In losing him, Colorado and the Territories associated with her in the diocese—New Mexico and Wyoming—have lost an untiring worker for their best interests. He has gone down to the grave full of labors, and it is meet that he should have fullness of honor also, for, among the many who have contributed to exalt this region to the position which it now holds, none have done better or more faithful service than Bishop Randall. For the following sketch of his work whilst in the West, we are indebted to the *Rocky Mountain News*:

"Having been chosen Missionary Bishop to Colorado, Bishop Randall arrived in the territory in June, 1866; making the journey across the plains in a stage coach. He came, as a pioneer, to lay the foundation of the Protestant Episcopal

Church in the Rocky Mountains, and to identify it with the growth and civilization of Colorado. There were at that time but two parishes in the Territory,—St. John's at Denver, and St. Mark's at Central. The Territories of New Mexico and Wyoming were also added to his diocese. The field was a broad one, and the work to be performed a laborious one; but it did not dismay him to whom it had been entrusted. He entered upon his duties with a firm reliance on Divine aid, and with an energy, perseverance, and enthusiasm worthy of the church and of the cause to which it has ever been devoted. How great his success was; how much he accomplished during his seven years' labors as a Missionary Bishop, is best told by a simple review of its results. Parishes have been organized and churches built at Golden, Nevada, Georgetown, Pueblo, Cañon, Colorado Springs, Idaho, Littleton, and Baldwinville; at Cheyenne and Laramie, in Wyoming territory; and, we believe, at one or two points in New Mexico. Wolfe Hall, the largest and best young ladies' seminary in the West was opened in 1867. In 1869, Jarvis Hall, a school for boys, was opened near Golden; in 1871 a school of Mines was added to it, and in 1872 Matthews Hall, a divinity school,—the three comprising "The Colorado University Schools,"—the beginning of a large and influential educational establishment. All of these institutions are under the auspices of the Church. Parish schools, under competent teachers, have been opened at several other points in the three Territories; and a large amount of missionary work done at the remote points, and in distant settlements. The Bishop's labors were unceasing; he travelled annually over his entire diocese; from Silver City, eight hundred miles to the southwest, on the farthest borders of New Mexico, to the outposts of the Wind River valley, five hundred miles northward, he journeyed each season, enduring hardship, encountering dangers, suffering deprivations, preaching the gospel of Christ, and performing the various sacred duties of his high office. Never was there a more faithful, untiring, devoted worker; seldom has such labor been more visibly or abundantly rewarded.

\* \* \* \* \*

"It is not difficult to class Bishop Randall

among those whose names live after them, and whose services exercise a never-failing influence upon human affairs. He was one of those efficient, quiet workers, who stamp their character upon their times and become the sources from which flow those strong currents which direct the course of future events. With the growing civilization of the Rocky Mountains Bishop Randall has identified himself. He has aided in shaping our social, mental, and christian development. Others have built railways, developed mines, encouraged agriculture, created commerce, and given impetus to our material advancement. Bishop Randall has built churches, established schools, and set in progress those varied reforming and regenerating influences, without which society would become a wreck, and civilization a shame. We cannot judge of the greatness of his work by what we see about us. We must cast our eyes to the future, and estimate its far-reaching and broad-extending influence upon generations yet unborn. The West loves to honor its pioneers in every branch of the noble work which has fallen upon those who have settled upon its great plains and along its mountain slopes; and Colorado will always fondly remember those of her adopted sons whose services were spent in shaping her future, and in endowing her social and material life with those elements which give vigor and force and power to her civilization. Among these there will be no name more distinguished, no memory more revered than that of George M. Randall, the first Bishop of Colorado."

GREELEY.—That Greeley is a purely agricultural community is very evident from the manner in which it is built. The houses are scattered about here and there, at a considerable distance from each other, over a very large extent of territory, running back up the valley of the river (the Cache-la-poudre) for many miles towards the mountains, while in most of these Colorado towns they are closely huddled together on one or two long and bare unattractive-looking streets. Along the principal thoroughfares rows of cotton-woods have been set out, most of which appear to be thriving and healthy, and in the centre of the village a public square has been laid out, in which a couple of fountains have been placed, and young shade trees planted, while from a mound in the centre a tall flagstaff rises, which reminds one of the village green in New England. A very great addition to the appearance of the town is a handsome \$25,000 school-house, which will soon be ready for occupancy. Of churches there are, of course, a sufficiency, as this is a temperate and consequently a very moral community.—*Springfield Republican*.

## THE GOLD ROBBERS OF '65.

On the evening of the 24th of June, 1865, the writer, then one of the editors of the *Mining Journal*, in Black Hawk, accompanied by Robert A. Clark, City Marshal, walked to Central in the bright moonlight to witness the "raising" of a mutual friend to accepted fellowship in the Masonic lodge. Bro. J. T. White occupied the "East," and the order was in the zenith of its fame and influence. The ceremonies concluded, we returned to our apartments in the *Journal* building, and were preparing to retire, when Marshal Clark rapped at the door and was admitted. His face betrayed the traces of extreme anxiety, his manner that some terrible secret perplexed his mind. Intimate friendship soon unsealed his lips, when the details of the most formidable conspiracy ever devised within his experience was revealed. A party of desperadoes, five in number, he said, had matured a plan for robbing the Black Hawk Mill safe of the bullion and amalgam deposited there, the house of Dan. Moore, who kept a small groggery near the present site of the Colorado Central depot, and who was supposed to have considerable money, and several others, at one bold stroke, and then flee the country. His information came direct from one of the gang, a big, burly fellow named Eymon, who, either too cowardly to take the chances, or wanting confidence in the courage or honesty of his fellow-conspirators, went to Clark and made a clean breast of it, promising to keep him advised of every movement, with the understanding, of course, that when the crash came he was to be protected. The attempt was to be made that night between one and two o'clock on the Black Hawk mill and office, but might be postponed until the one following. The brave, lion-hearted Marshal quickly made his arrangements. The night passed, but nothing occurred. A day or two afterward the robbers changed their plans for a single new venture. In those days Uncle John Sensenderfer gathered enormous yields of gold weekly from his Bobtail property, the ore being crushed in his mill, located far up North Clear Creek in a silent, out-of-the-way bend of the cañon far from settle-

ments and neighbors, the nearest being a house of prostitution kept by the notorious Moll Greer, whose nefarious business was carried on among the lowest and vilest of God's creatures, in a two-story log house situated on the bluff within sight of the mill. Uncle John slept in one of two small apartments which composed his office, located on the brink of the water canal which carried the power to run his stamps. In the other was his safe, desk, a few chairs, and a small stove. Fearing no danger from nocturnal prowlers, he was in the habit of allowing his gold to accumulate in the safe, frequently to the amount of ten, fifteen, and twenty thousand dollars. He loved to open the iron doors and enjoy the golden spectacle within; to show the beautiful treasure to his friends when they called. He never tired of talking about his good fortune, and what he would do when he "got rich." Uncle John was a genial old man, but close-fisted. On the street he was quoted among the soundest but most economical of men—pleasant in manners, much liked, and somewhat envied by the less fortunate workers of mines.

By some means all this information reached the ears of Eymon's gang. Their scheme was quickly laid. They made Moll Greer's house their headquarters, whence the situation was thoroughly scanned. They were to blacken their faces, wear disguises, break into the office at midnight, murder the old man if necessary, possess themselves of his keys, plunder his iron chest, and then leave the country by different routes to elude capture.

Clark, being apprised of everything by Eymon, whom the rest never once suspected, quietly arranged a select force of reliable assistants to circumvent and bag the outlaws. Sensenderfer was notified to remove all treasure from the building to the banks in Central, and on no account to sleep in his accustomed place. The utmost secrecy was observed. A party of four or five, armed with rifles and shot-guns, was posted in the mill. Another, headed by Clark, concealed themselves under the office. Night after night passed and no robbers appeared. At length their

courage was screwed up to the sticking point, and the five, disguised beyond recognition, their faces veiled in burnt cork, the black, silent, light-tooted procession took up its line of march. They reached the porch. Passing to a little window they raised it carefully, and all but Eymon passed in. He remained outside to watch. They first examined the bed-room. No one there. Next the safe. Whether it was unlocked, or the keys left where they could find them, or they attempted to force it with burglars' tools we cannot now remember, but soon after they had commenced operations, a shout rent the air, a glass was shattered in the window, a revolver shoved in, and a voice exclaimed, "Surrender, you infernal villains, the house is surrounded, you cannot escape!" It was Clark. His answer was a pistol shot. The ball cut the skin of his forehead. Instantly he returned the fire—the door was forced open, when a tremendous volley poured in from the mill. The whole face of the building was literally riddled with bullets. Clark emptied his revolver into the room in far less time than we are telling of it. The smoke cleared away, quiet was restored, a light struck, an examination made. One of the robbers was dead, another desperately wounded. While surveying the scene, a ball came crashing through the window from the outside, piercing Clark's arm above the elbow. Again all was confusion. A search was immediately instituted for the missing, but no one was found. Trails of blood, showing they had been wounded, were traced down the bluff into the road. It was too dark to follow them, but the dawn soon broke over the horizon, and the search continued. Every tunnel, drift, cabin, prospect-hole, nook, and corner in the gulch and on the hill-sides was ransacked by armed men. At length Moll Greer's house was surrounded. The bloated old hag was interrogated, but would tell nothing. The loft up-stairs was dark, gloomy, noiseless, forbidding. "Let's go up," said Clark, who sprang to the rickety stairs and mounted them with three jumps, the rest close at his heels. By the few gleams of light which crept in through the interstices between the mud-cemented logs, a low, miserable bed was seen in the darkest corner. Upon it lay a man apparently asleep. Half a dozen pistols covering him he was awakened and

ordered to get up. He opened his eyes lazily, raised himself on one elbow, with an air of well-feigned amazement at the rude summons agitating his whitened face. After some time spent in parleying, he was taken by main force from the couch and made to stand up. There were no evidences of wounds. Presently the crimson witness of his crime began to trickle down to the floor from his right arm. The sleeve being rolled up, a ghastly perforation was seen, which had been carefully bandaged with wet cloths. Then Clark knew his man, and that his name was Bill Cunningham.

He was dressed, his arms tied behind him with strong cords, and marched down to Black Hawk. By this time the sun was out in full radiance, and the town alive with people. Lynching was freely talked of, the invariable topic which followed any sort of crime in those days. Better counsels prevailed, however, and an informal court convened in the large hall over what is now Warner & Scobey's liquor store.

Meantime, hundreds of people visited the scene of the attempted burglary. Sensitive's office was a sight to behold. Nearly every window was broken, the entire front splintered, torn, and perforated with bullets. On the little porch, side by side, lay the dead and dying, whom Clark's revolver had stopped at the threshold. Their blackened faces, gaping wounds, oozing brains, dirty clothing, presented a horrid spectacle, never to be forgotten. During the forenoon, the one was buried, the other brought to Black Hawk. Surgeons pronounced the wounds mortal. Nothing could be done; the victim was utterly unconscious. They laid him on a pallet of straw and left him.

For Cunningham's trial a jury was summoned. Who presided we can't remember. All other citizens were excluded from the room. While these proceedings were in progress the infuriated citizens were at work on the public square. Whatever the result of the inquiry they intended to hang Cunningham. Several heavy wagons stood on the plaza. The tongue or pole of the strongest, was placed upright, and a rope with a hangman's noose suspended from it. For a platform, a large dry goods box was rolled up. All things being in readiness, the crowd awaited their

prisoner. So busy had they been with their preparations, they failed to observe the presence among them of the man, who, as the representative of the law, stood quietly watching the work, fully resolved to thwart them. This man was William Z. Cozens, Sheriff of the County. He had obtained admittance to the court-room just long enough to demand of the jury their prisoner after the trial should be concluded, but no one among them believed for a moment that he could ever hold him five minutes after the doors were opened. The people were determined upon lynching, and lynch they would, in spite of the officers. Clark, worn out with watching, his arm badly swollen, and in great pain, was in the hands of the surgeons.

At length the trial was over. Cozens stood at the door, seized Cunningham as he came out, marched him down stairs into the street. Both were instantly surrounded. Drawing his big, ugly dragoon pistol, Cozens ordered the surging mass to open the way, and, without waiting for them to obey, advanced. The crowd fell back, scarcely knowing why they obeyed, except, perhaps, that the Sheriff was a man whom they dared not resist. Most of them had seen him two years before, standing, like a wall of defiance, between them and Van Horn. Without pause or hesitation, he continued, walking slowly but firmly up the street, through Black Hawk to Central, a mob at his heels the whole distance, not one of whom had the temerity to obstruct his progress or touch his prisoner. Cunningham was lodged in jail. Eymon, the only witness by whose evidence he could be convicted, was also incarcerated. After a time he was let out on bail. Realizing the value of liberty, he seized the first op-

portunity and disappeared. When Cunningham came to trial, there being no proofs, a *nolle prosequi* was entered, and he released from custody. He went to Omaha, lounged about there for awhile, and finally turned up in Julesburg among the roughs of that desperate town. Following the track-layers of the Union Pacific from point to point, he was killed at last in a bagnio of his own keeping.

Leach, the wounded man, was brought to the jail in Central City, where he lingered in a semi-comatose condition several days and then expired. He was buried in Dry Gulch, near its head. The doctors resurrected the body for dissection, conveying it under cover of darkness over the Pat Casey road into Chase Gulch. Casey's mill was running. Some of the "night hands" came out as the body rounded the turn, when the resurrectionists, taking fright, shoved poor Leach's remains into an abandoned tunnel near by, and took to their heels. Next morning the corpse was discovered, and the cry of murder startled all Black Hawk. A thousand wild rumors filled the air. The hoax was soon explained, however, and the hubbub died away.

The fourth partner in this tragic affair was named Smith. He contrived to elude the hot pursuit of the officers, and soon dropped out of sight and hearing. Some one told us the other day, they saw him in Cheyenne not long ago, but he had changed his name.

Poor Clark, the bravest of the brave, the idol of the city, the model Marshal of the Territory, the terror of evil-doers, great, generous-hearted Bob, was assassinated four years later, while in the discharge of a perilous duty. The history of that terrible affair is still fresh in our memories.

—*Central City Register.*

## IRRIGATION AND FERTILIZATION.

A correspondent of the *Greeley Tribune* writes as follows upon the above subject: Corn fodder has been noted in the East, even when cultivated year after year upon the same ground, as drawing almost imperceptibly upon the store of fertility in the soil. Oats have not in the Eastern States been particularly noted as an exhausting crop;

but both are decidedly so here, and, like many other Eastern notions of agriculture, will have to be abandoned. Forty bushels of oats is a fair yield on the bluffs, on land which will average twenty-five bushels of wheat per acre. The cost of cultivation is about the same per acre—about an average of \$20. The forty bushels of oats, at

the average price for the last two years—about sixty cents per bushel,—would give a gross return of about \$24, or four dollars above cost of cultivation, for rent of land, interest on capital, wear and tear of machinery, etc. Twenty-five bushels of wheat at the average price of last year,—\$1.35 per bushel—gives \$33.75, or \$13.75 above cost of cultivation, making a difference in money return of \$9.75 in favor of the wheat, to say nothing about the injurious effect of the oats upon the soil, and that other nuisance, the mixing of the coming wheat crop with volunteer oats. They won't pay, and as a rotating crop they are out of the question. We must try some other grain for our horse feed. Probably barley—which is said to be slight in its draft upon the soil,—will be the best. At all events, I have sowed my last bushel of oats for some time to come. For fodder, probably, our best plan will be to set apart a small lot of sufficient size, for its yearly use, and replenish the soil with liberal dressings of barnyard manure.

While touching upon the subject of the exhaustion of the soil, let me stop to say that many of the pieces of land in our vicinity which have now been under cultivation three or four years, show unmistakable evidences of a diminution of fertility, and the scanty crop on such pieces admonishes us that the soil, good as it is, is not everlasting, and to be kept up to its original fertility, must be properly managed, cultivated in the most thorough manner, and relieved of the great draft upon its stores of fertility by systematic rotation of crops.

Enthusiasts upon the subject of irrigation are prone to dwell upon the immense quantities of fertilizing material deposited upon the fields, in the application of water, and we should be led to believe, to hear them talk, that soil cultivated by means of irrigation, would never wear out, but would continue to grow richer and richer, like railroad corporations, clear down to the end of time. Now the thing is simple enough, beautiful, I may say, and seductive withal. The plant, you see, requires food, so much of so much, and so much of so much, per theorem, all of which is contained in the water, and as fast as certain elements of plant-food are taken from the soil, the soil is again supplied by the water, and so on, *ad*

*infinitum*; but the facts in the case won't warrant any such conclusion, and practical men accustomed to dig in the dirt on the farm, take little stock in these speculations. The fact is, that most of the experiences backing this theory come down to us from the famous fertility of the water of the Nile, laden with the sediment of the great marshes and reedy lakes of Africa, and bearing, I suppose, in its constituent elements, about the same relation to those of the Big Thompson and the Poudre as warm pea-soup does to cold spring water.

I am not going to argue that the water of our rivers is entirely destitute of fertilizing material but, as authorities upon the subject agree, that the main benefits derived from irrigation are due to foreign substances contained in the water, and, moreover, that the water from mountain streams containing, as it does, principally mineral substances, is of no great benefit as a fertilizer except upon soils containing a large proportion of humus. I conclude from this, and from my observation in the matter, that the fertilizing properties contained in the waters of our rivers are not on the whole more than equal to the large percentage of ammonia contained in the rain-fall of the Eastern states, and that the only material advantages resulting from irrigation in Colorado are due to our ability to apply or withhold the water at will, with that regularity not to be obtained in countries entirely dependent upon the natural rain-fall.

This is, I am aware, divesting the process of irrigation of a good deal of the glamour of romance with which the minds of enthusiastic admirers of the theory has invested the subject, but the advantages remaining are sufficient for me, and I shall proceed in my operations upon the farm with the view of keeping my land up to its present degree of fertility in the good old way, calculating that in some form or another, aside from irrigation, I must restore to the soil all that I take from it in crops.

*Note by the Editor.*—We publish the above, because we believe that the experience of any practical and sensible man in reference to irrigation, is of value and worthy of record. It is to be borne in mind, however, that experience in other sections (exclusive of the Nile bottom) has very plainly demonstrated the fertilizing value of irrigation. In Mexico, for instance, there has been abundant experience to that effect. The writer says, he doubts whether the mineral ingredients in our Colorado water, do more than compensate for the ammonia in the rain-water, which falls upon Eastern fields; he seems to forget that, in Spring time, when irrigation is most practised, the mountain streams are largely fed from melting snow, and therefore have all the fertilizing ingredients of rain-water in addition to those derived from the ground-down rocks of the mountains.

## MISCELLANEOUS SELECTIONS.

URSA MINOR.—He was a native, if that term can be used, of the Raton Mountains, in New Mexico. The aboriginal hunter who slew his mother was a Ute. Moved by a strange touch of tenderness, he wrapped up the tiny little creature and took it into Trinidad, where he sold it to a Philadelphia traveler, Dr. L—, who took a fancy to bring it to his friend, Mrs. M—, of Glen Eyrie. It oddly happened that this lady had always had, in the "many mansions" of her great and tender heart, a little house set apart for a pet bear, which had never come to her. Now he was on the way—traveling as fast as the stage coach could carry him. He had to be fed on milk from a bottle, and, when hungry, as was frequently the case, would cry so like a child that passengers, seeing in the doctor's arms a bundle very like a baby, were moved to gentler sympathy. At Colorado Springs, the doctor had a chance to present his offspring in person. Mrs. M— graciously received it in a box, which was deposited in the bottom of her carriage. Then she set out for home. But the way was long, the bottle was empty, the bear was hungry. He cried, he whined, he roared, he broke from his box, tore round the carriage, and had to be held by two strong hands. Even at that age this mate of an *ursa minor* displayed extraordinary strength and spirit. Arrived at the house, he was well fed till he was gorged and grateful, and dropped off into a happy slumber, lying on his back with all four feet in the air. It was some found impracticable to bring him up on the bottle, as his fierce appetite caused him to devour the indigestible India-rubber tops. He was next taught to drink from his mistress' fingers laid in a saucer of milk. He would always grasp her hand with both his paws, and hold it firmly till he was through. He was allowed to run freely about the house, and while from the first singularly playful and cunning, was gentle and affectionate. He learned easily various tricks, such as walking on his hind legs and standing on his head. For music he showed a strong liking, preferring that of a lively character. Whenever he heard the piano he would prick up his ears, leave play, his bed, anything but his dinner, go and seat himself beside the player, and listen with all the air of a musical critic. In mischief he surpassed small boys, puppies, and monkeys. He delighted to get at a nicely made bed and turn it into a "mare's nest." He was the torment of the poor Chinaman's life—slyly creeping into the laundry, and in an instant turning his baskets of neatly-ironed clothes topsy-turvy. More than once he reduced Ah Sin to despair and tears. At last he began to make foraging raids into the store-room, and one day was found heels over head in a cask of sugar, having "a sweet, refreshing season." Soon after this he was banished to the barn, where, as he frightened the horses and cows, he was chained in his little pen. But he worked at the spring of his chain until he opened it, and escaped to the house. He stole in, went directly up stairs, turning the knobs of all the doors that hindered his progress, made his way to the chamber of his mistress, tore all the clothes off the bed, danced and tumbled, and had a high old time generally. Little Macduff, now about six months old, is seeing life and having a tolerably good time at the gay watering-place. He is petted, hepraised and sugared—he stands erect, and balances on his head for very distinguished people, who condescend to laugh at his droll and jolly ways. He has been promoted to a meat diet, but he has not forgotten his old home and earliest friends. When his mistress and the children go over to see him, his bear's "heart melts" within him. He is overjoyed to see them all.—Grace Greenwood.

OUR CHINESE MINERS.—Passengers over the Colorado Central, as they are whirled either way through Clear Creek Canyon, peer anxiously from the car windows as the train halts at Cameron's Camp, where nearly a hundred Chinese are domiciled. An inspection of one of their huts will show that what is stinted room for two Americans is spaciousness for a dozen Chinamen. Like a car or an omnibus, a Chinese hut is never full, nor is it ever quiet. Privacy is not one of John's luxuries—he wants a bouseful. These eighty or a hundred Mongolians are squeezed into six or eight small huts. They are not nice about their houses. Smoke has no horrors for them, and soap they keep entirely for their clothes and bodies. Floor and wall-washing are things never hinted at. The chattering in these huts, in the evening, after work ceases, and during meal times, is incessant. Their table talks are full of noisy jollity. They often sing, during evenings, in a monotonous catterwaul, which serves first-rate to awaken the echoes. There are two or three stringed instruments in camp, whose sounds are a modified species of saw-filing. The principal articles of American wear purchased so far in Central and Black Hawk by these Chinese are coarse boots. They require them in mining operations. They generally hay the biggest sizes, thinking that they thereby get the most for their money, and when their No. 7 feet chafe and wobble about in No. 10 boots, they complain that they "fit too much."—Register.

THE NATIVE GRASSES OF COLORADO.—The native grasses of Colorado, whether on the plains or at the foot of the mountains, are very nutritious. This is proved by the sleek, thrifty condition of the numerous herds feeding upon her natural pastures. The testimony of every stock-man and farmer of whom we inquired, and they were numerous, was, that the native grasses were more nutritious and better relished by stock, than the cultivated grasses of the East. Men of undoubted integrity, who were brought up farmers in New York, Pennsylvania, and the New England States, and who had been living in Colorado for some time, engaged in cattle-raising and other kinds of farming, all seemed to agree upon this question. Some farmers who were raising the cultivated grasses, assert that they had repeatedly tried the experiment of placing the timothy and other cultivated grasses, nicely cured into hay, before cattle, and, at the same time, hay made from the native grasses, and the beasts invariably would take to that made from the native herbage first. The grass on the Plains grows sparsely and does not form that thick, solid turf, as in the pastures of New York and New England, and it is hard for an Eastern farmer, on his first view of the Plains, to conceive the idea of these grasses, in many places brown and crisp, as affording good pasturage for stock. And yet all the cattle which he meets, look sleek, thrifty, and fat, and the beef furnished at table is tender, juicy, and delicious. It is true the herds at present have immense ranges. Still, after duly weighing all the facts, one gradually comes to the conviction that the natural grasses of Colorado are more than ordinarily nutritious as cattle-food. So far as dairying is concerned, in the country along the base of the mountains, at the entrance of canyons, and at various places along the sides of these deep gorges, and in the parks, butter dairying can be carried on with every prospect of success. The cool climate, the pure, sweet, cold water, the nutritive grasses, all seem better to adapt it to that specialty than to cheese-making. Again, the ever-increasing population in "the mines," already gives a vast demand, a permanent and enduring market, which must continue to grow larger and larger from year to year.—Rural New-Yorker.



AT THE HEAD OF THE ARKANSAS.—A member of the Hayden Expedition writes as follows to the *New York Tribune*: The time will perhaps come when this region will be visited, like the Yosemite and Yellowstone National Parks for its picturesque beauty and intense scientific interest. But it must first become more accessible and inhabited; and for that it must become economically valuable. Perhaps the fate lies before it in no distant future. A new mining district is just opening in the neighborhood, at the head of the East River, within ten miles of Gothic Mountain, which is attracting much attention, and holds out fair promise of successful working. The ore is argentiferous galena, of which a principal lode, sixteen to thirty feet wide, has been traced for over half-a-mile; nor is it the only one. A successful body of miners would call into use the agricultural resources of the valley, which are much above the average, and we shall see a permanent population scattered along the streams, as in the mountains further east. Then, for one result, all the peaks and gulches and creeks will get names, by a more natural process than that of baptism by a survey. Nomenclature is one of the trying duties of an exploring party. What, for example, shall this whole great group which we have just left be styled? The name of Elk Mountains, found on some of the maps, seems quite too trivial to retain, especially as the elk, to all appearance, have now taken up their residence elsewhere. We should like to call it the Chromatic Range, from its wonderful hues; but that is an appellation of too learned a caste to become popular and win acceptance. The view of the National Range, as we came out from the deniles into the valley of Taylor River, seemed still more grand than when we saw it last. We camped one night amid the intricate moraines at the western base of the pass; we admired the unrivalled glacial scorings and polishings all down the valley of Lake Creek; we enjoyed anew the beauty of the Twin Lakes, set in the edge of the mountains and reflecting their lofty summits, and, it must be added, we sat down with immense satisfaction on chairs at the Lake House, for the first time in three weeks, and satiated ourselves on milk and cream and the products of woman's cookery. Here, only a few miles up the valley, we are directly opposite two of the greatest peaks of the range, both exceeding 14,000 feet. One was named Mount Elbert, last month, after the present Governor of the Territory, by a party of miners appreciative of his services "in procuring the revocation of the San Juan order," (they left a plate to that effect on the summit); the other we have known as Massive Mount or Grand Mount, from the peculiar grandeur of its outlines and immensity of its proportions. North of the latter, the range falls off in height, not showing for a dozen miles any summit of more than 11,000 or 12,000 feet; then it rises again into the Mount of the Holy Cross, which we are next to visit. Near us, the valley shows remarkable river terraces, as well as the moraines which distinguish its whole course. Close by us is the remnant plateau of an immense one, some three or four hundred feet above the present river bed, and as smooth and regular as a table. The valley bottom is richly grassed and there are occasional ranches upon it. The river is turbid with the mud washed into it from the placer mines in the gulches. Yet the region is not what it once was, as regards the prosperity of its mining interests.

DEAD MEN'S GULCH.—Just about fourteen years ago a party of eight prospectors had wandered over into this region in search of placer gold diggings. It was immediately after the wonderful discovery of "Pound Digging" at Tarryall, which set so many people wild. The party camped in the gulch over night, and the next morning set out as usual, following along the narrow valley. Naturally they were in a little while strung out to a considerable distance, with their pack animals scattered along between

them. All at once a murderous volley was opened upon them from the bushes and rocks on the right and left. Most fell at once. Those who did not, escaped for the moment only to be shot down a little further on. Seven men and twelve horses were killed. One man was hurled from his flying horse into the willows, secreted himself, and escaped. On the eighteenth of August, 1859, the writer and four others were prospecting, and hiding from the Indians, on the headwaters of the north fork of the Platte. It was just after the massacre of Doctors Shank and Kennedy, at the end of Mount Evans. In struggling through an almost impenetrable thicket of brush to find a crossing of the stream, we came upon the sole survivor of that massacre. He was crouching under the drooping branches of a fir tree, trying to boil a cup of coffee over a fire that certainly would not have filled his two hands. Rain was falling, and the little wretch of smoke arising above the bushes attracted attention, else we would have passed within a dozen feet without suspecting the presence of any one. He seemed dazed and stupid, taken by surprise and unwilling to talk. With a good deal of questioning, however, we learned that he was the only survivor of a massacre by the Indians, somewhere away off in the West. When darkness came on after the day of the murders he crawled from his hiding-place, looked upon the bodies of his slain companions, pulled out some of the arrows, found some remnants of their provisions, and started back. He traveled nights and hid in the day-time, until he got into South Park, where there were by that time a great many white men. We looked at the arrows and other bloody relics, and, exacting a promise that he would call at the *News* office in Denver and give all the particulars, we left him. He did not call, and we never saw or heard of him again. Later in the season another party of prospectors came this way and happened upon the carcasses of seven men and twelve horses strung along the gulch for half a mile. Hence the name. It is somewhat remarkable that the Indians should kill horses instead of capturing them, but it is an indisputable fact that they did it in this instance. Probably, it was to prevent their identification thereafter. We believe the crime was subsequently fixed upon the Uintah Utes.—WM. N. BYERS.

COLORADO AND SWITZERLAND.—A month in Colorado has given me an opportunity of observation, interesting if not profitable. This Summer the Territory is fuller than ever before of tourists and invalids. This Rocky Mountain Region seems destined to become the great recreating and recuperating ground of the continent. Soon it will be as embarrassing to say "No" to the question, "Have you been to Colorado?" as it is now to say "No" to the question, "Have you been to Europe?" It will become vulgar to go to Europe, after a little, and fashionable to come to these mountains. The air and scenery here are grand beyond description. The water is pure, and as clear as crystal. The resident population is brisk and intelligent. The hotels are fair, and becoming better. What is wanted is a greater number of small and neatly kept houses tucked into right places in the mountains, *a la* Switzerland, to give entertainment to tourists for the night. Now, in order to see the better points, the wildest scenery, and the parks of the mountains, one is obliged to camp. These parks are wonderful, and the scenery is on a scale of magnitude and awful grandeur, which no merely Alpine tourist ever dreamed of. Switzerland is bold and beautiful, having points which I have never seen equalled in these mountains. The glacier, the most wonderful feature of Swiss scenery, is entirely wanting here. But as to greatness and breadth and sweep, no comparison exists between the two regions. The Rocky Mountains, viewed at Denver, give you two hundred miles of snowy range in full sight to the naked eye. The vest pocket of the Rocky Mountains will hide Switzerland.—*New York Examiner*.



WHY IS THIS THUS?—The scientists who sit in their sanctums by the sea, and waste the precious hours in working up theories which they expect the unlettered masses to gulp down as truths, without question, had better come out to Kansas and Colorado this season, and then go home and work up something new. Here have these precious old Solomons been telling us about the wonderful climatic changes that can be produced by tree-planting. The settler in the prairie need not even become pious and pray for rain, if he would only set out a few trees. And the dweller in a timbered land was threatened with the simoon of Sahara if he should denude enough woods for a potato patch. Sniktau, although mighty skeptical in regard to "scientists" ever since Darwin claimed the name, became a convert to this tree-make-rain theory, and allowed the lilac sprouts to trespass upon his lawn, and the locust seed to germinate to the detriment of his cabbage garden, in order that he might secure rain in season to ripen his strawberries. But the theory wouldn't work worth a cent. And now, after the Kansas folks have paid out more money for trees than they have for taxes, their crops are burning up for want of rain! And here, in the mountains, where once primeval forests stood, and rain was almost unknown, we find hills destitute of trees, shorn of these arboreal adornments by the ravages of fire and shaven clean by the woodman's ax, and there's rain-water till you can't rest. Why is this thus? Which of the scientific theorists will "rise to explain?"—*"Sniktau," in Colorado Miner.*

AN ANCIENT FORT.—At the summit of the Boulder Pass are what, upon careful investigation, I conclude are the remains of an ancient battle-ground. I have often wondered, in passing over the range, what had caused this singular formation—those rock pits, and these long, regularly laid stone walls. I determined to make a careful investigation of the whole field of operation, and to my great surprise these works give unmistakable evidence of being the work of human hands. Here are two stone walls, two or three miles in length, compact and regular, and giving every evidence that they were built by human hands, apparently to mark the boundaries of lots or parcels of lands. The walls are not so high as farmers now use to enclose or sub-divide their farms, being only one or two feet high. These walls enclose three distinct fields of about 160 acres each, in the middle of which is a beautiful spring of pure water. On either side of the middle field is a ridge of rocky land extending from the South to the Middle Boulder, upon which the end walls of the field are built. Near by, and on either side of the walls, are numerous rock pits, round, and from one to four feet deep, and from four to eight feet across the top, the whole exhibiting skill and workmanship that fully convinces me that this has been the work of human hands, and these have probably been war pits. Following the stone walls to the corners of the fields I found large flat rocks eight feet across. These were laid on top in line with the walls as if to mark the true course of the different possessions. In the corner of one field I found a bow, about three feet in length, made from hemlock wood, and having the appearance of great antiquity. The grain of the wood is worn from the bow fully a quarter of an inch, leaving knots protruding.—*Correspondence Rocky Mountain News.*

ADAPTATION TO SURROUNDINGS.—It is interesting, especially to one of an evolutionary turn of mind, to notice, as one travels through the country, the perfect adaptation to surrounding conditions which the plants and animals present. Without going into details, it may be stated that the same plant which is tall and luxuriant in the Mississippi Valley, becomes dwarfed and bushy on the higher level and in the more dry and windy climate of Colorado. A good illustration is furnished in the wild sunflower met with all through the country we have traversed since we left St. Louis. In some of the richer lands of Texas and

Kansas, it attains a height of five and six feet, or more, with flowers equalling those in cultivation. Nearing Denver, large stretches of it may be found which do not exceed six inches in height. All the intermediate grades occur, and though it has received more than one name there can be no question as to its being but one species, or that it is the parent of our cultivated varieties. Again, in ascending the mountain, plants acquire increasing power of resisting cold, and of developing rapidly. Species of *Eritrichium*, *Saxifraga* and *Sedum* may be found above the snow line, crowding all their life functions of blooming and seeding into the brief compass of the alpine summer; while they often, with such plants as *Polemonium alpinum*, *Gentiana frigida*, *Mercurialis alpina*, *Prunella glauca*, etc., rear their flowery heads through the snow and endure freezing with impunity. There seems to be a relation between diminutive size and power to resist cold in plants which becomes intelligible, since Professor Mohr demonstrates that small cells better resist freezing than large ones. The adaptability hinted at above, is noticed in the animals also, for with the exception of the bison, which being monarch of the plains, has not been made to simulate its surroundings by a selective process, almost all the other animals have the peculiar tawny-grey color which is the general hue of these plains.—*Prairie Farmer.*

MIDDLE PARK GEOLOGY.—Professor Hayden tells us that the Middle Park differs in its surface-features from any of the others. It may be divided into at least four lake basins. He calls them lake-basins because they are really the beds of ancient lakes, which existed far back in the geological past, thousands of years ago. The white and yellow sands and marls which still remain to the thickness of several hundred feet, fully attest this statement; but their nearly horizontal position in relation to the other formations indicate that they are of quite modern origin, geologically speaking. He might divide these basins into the Lower Grand, below the canyon near the Hot Springs; the Hot Springs Basin; Upper Grand Basin, and the Fraser River Basin. These all form basin-like areas in themselves, covered with a good growth of grass, with mountains or high woodland ridges encircling them on every side. The Middle Park is intersected with dykes of basaltic rocks to a great extent. It is in these once melted rocks that we find the moss or wood agates. Red and yellow Jasper covers the hills in the greatest abundance. The Indians of ancient times used to resort to these places to procure materials for their arrow-heads, and chipped flints and broken arrow-heads occur quite frequently. He says he has found these evidences of the Indians' handiwork in all parts of the West, and has often inquired of different tribes about the period when their ancestors used them. They invariably reply that the Great Spirit only knows, they do not; which implies that the time is beyond the memory of any now living. Among others, he says, I found an old chief who could recollect back seventy years, and he did not know when stone implements were in use among his people, although all kinds of stone instruments are found about the ruins of their old villages in the Platte Valley.

CLIMATIC CHANGES.—There is scarcely a person in the United States but knows it "never rains in Colorado." People from the East, during the Summer just past, have seen our frequent showers; especially the one in June, which nearly washed the foundations of the city out from under us, and, with their pantaloons rolled up above their boot-legs, have shouted out from under their umbrellas, "It never rains in Colorado;" and our old settlers have told them that it is very singular and strange, because it did not use to be so. There is no doubt but the railways are producing climatic changes here, hence are doubly beneficial to the country. The planting of numerous trees, and the upturning and changing of the soil doubtless assist in the formation of clouds.—*Denver Times.*

## SUMMARY OF NEWS.

There are not less than 100 Swedes in Golden.

The public schools of Denver have 846 scholars enrolled.

The County Seat of El Paso County has been removed from Colorado City to Colorado Springs.

The Methodists are talking of establishing a university in Denver.

According to the *Press*, Longmont is making rapid strides since the railroad commenced running to the town.

A new wagon road is being opened from Breckenridge into the south end of the Middle Park.

A tri-weekly mail is to be established between Fort Garland and Del Norte.

It is believed by competent judges that Colorado has gained 10,000 population by emigration within the past six months.

Pueblo County has over 1400 votes according to the result of the late election.

The height of the Mountain of the Holy Cross as ascertained by the Hayden party, is 14,350 feet.

Dr. F. V. Hayden, chief of the geological survey of the Territories, has purchased a lot at Colorado Springs, and intends to reside there.

The public school building in South Pueblo, which is a very neat little brick, is almost completed, and will soon be ready for occupation.

The *Register* says that a Caribou boy, only thirteen years of age, and the support of an aged mother, has laid by a thousand dollars, the earnings of his own hands.

Dr. C. C. Parry, the celebrated botanist, who was the first to classify the flora of the Rocky Mountains, is stopping with a friend at Empire.

Colorado now has nine daily, one semi-weekly, and thirty-two weekly newspapers. Three dailies, the semi-weekly and nine weeklies are published in Denver.

New Mexico is receiving a quota of horses from California. Some 1,300 head were shipped over the Denver and Rio Grande the other day.

Miss Anna Dickinson has scaled five of the highest peaks in Colorado—Long's, Pike's, Gray's, Lincoln's, and Elbert's Peaks. These peaks are all over 14,000 feet above the sea.

In the appointment of the subscription committees for the "United States Centennial International Exposition," to be held in Philadelphia, in 1876, J. Marshall Paul, of Fairplay, is appointed for Colorado, with N. C. Mesker, of Greeley, alternate.

Professor Gardner, of Hayden's party, says there are twenty-two peaks in the Territory which rise to a height above 14,000 feet. Mr. William H. Jackson, photographer to the survey, has secured views of Long's Peak, 14,000 feet above the level of the sea; James' Peak, 13,800 feet; Mt. Gray, 14,300 feet; Pike's Peak, 14,300 feet; Mt. Lincoln, 14,200 feet; the Holy Cross, 14,400 feet, and numerous others. He has also a panoramic view taken from the summit of Mt. Gray, which sweeps a circle of about 150 miles in diameter, which includes Long's Peak on the north, the Holy Cross on the west, Mt. Lincoln on the south, and Pike's Peak on the southeast.

A large part of the town of Fairplay, in South Park, was destroyed by fire on the evening of Friday, the 26th of September. The fire originated from a defective stove-pipe that passed through a canvass ceiling, and up through the roof in the Fairplay House. Thence it spread from building to building, until about fifty were destroyed, entailing a loss of about \$100,000. Many of the citizens were left almost destitute, and a subscription has been made for their relief.

The Hon. F. E. Brunot, chairman of the Indian Peace Commission, has succeeded in bringing to a favorable issue the negotiations which have so long been going on with the Utes for the cession of the San Juan mining country. In this connection, we may quote the following from the *Denver News*:—"In the report of the Commissioner of the General Land Office, for the year 1871, the Ute reservation is said to contain 10,077,120 acres. If Mr. Brunot has had re-ceded to the United States three and a half million of acres of the reservation, there remain yet 15,577,120 acres, or about 3,895 acres to every back, squaw, and porpoise in the whole Ute nation—counting them at four thousand, which is a liberal number.

The *Pueblo People* says: It is an interesting sight to a Coloradan to notice the arrival of the invalid stranger from the States. He comes pale, feeble, emaciated, ready to die; he stays pretty closely within doors for a day or two. Then he begins to venture out. Day by day his strength increases. Soon he begins to talk of a trip to the mountains or of going out into the country. Nothing is seen of him for awhile. One day a ruddy-faced stranger steps up to you in a brisk manner and inquires after the news in town. You with pleasant difficulty are at length made to realize that this is the invalid stranger of a few months since. "How do I do? Oh, I can live in this country! I will have my family here soon." And we have seen more than one such case this year.

A New Mexico correspondent of the *Pueblo Chieftain* thinks the greatest need of that Territory at the present time, in order to secure the social, moral, and political improvement, is educational facilities, more liberal teachings on the part of the resident clergy and an abandonment of those besotted and circumscribed theological views which would deprive the youth of the country of the benefits of public schools and an education, simply because the religious tenets of this church or that, are not there instilled into their minds. The same correspondent thinks that public schools planted in every settlement in the Territory, with a well established system of compulsory education, that will make ignorance a crime, by placing within the reach of all the means by which to acquire knowledge, is also demanded by the exigencies of the situation.

The *Trinidad Enterprise* draws a comparison between Trinidad of seven years ago and the Trinidad of to-day: The dozen well-filled stores in lieu of the sordid holes which, though having no painted signs to indicate the names by which their proprietors wished them to be known, were designated by the synonymous appellations of stores, groceries, saloons, and robbers' roosts, where the principal commodity dealt in was whiskey, with tobacco thrown in—to the mixture; where hoon, bought of Government transportation wagons at eight cents per pound was retailed at seventy-five cents; five organized churches as the Sunday resort of the people, in lieu of monte banks, Main street pony-races, cock-fights, and the Saturday and Sunday night fandangoes, is enough to strike them as a different place from the Trinidad of 1866. Seriously, the rapid growth and substantial appearance which our town presents, are things upon which our citizens may well congratulate themselves:

The Denver Times, in publishing a list of persons in that city who have been assessed in sums of \$10,000 and upwards, says: "No city in the Union, excepting Hartford, Conn., can make such a showing, proportionately, of resident wealth. Next to our city in this respect comes San Jose, Cal., and there the agency which brings it about," is different from the one which has mainly operated here. With them it is caused principally by the great influx and after residence of wealthy invalids from all quarters of the globe. There you find a cosmopolitan collection of people greater in difference than can be found elsewhere. With us the main agency which has tended to make us so solid and substantial is the one which is wrought by the accumulation of capital from all parts of the Territory, consequent upon our city being the great business centre. With us, too, there are many who have invested largely in real property, and who have been induced to remain here and interest themselves in our great future for reasons of climatic advantages. To be sure, the opportunities yet offered in this city for other legitimate investments are numerous, notwithstanding the many profitable ones in operation. The prominence of Denver as the railroad centre of the coming West, has largely aided in bringing about the present great resident wealth. With the centering here of other lines of railroad, some of which are now under construction, we may truthfully predict for our city an aggregate wealth of \$4,000,000 by the 1st of September next.

### MINING INTELLIGENCE.

Cameron, of the Black Hawk gulch mines, has gone to California for more Celestials.

A rich silver-bearing district has been discovered near the head of Chalk Creek, Lake County. The ores are principally galena and carbonates of copper.

Placer digging on Arapahoe bar, Jefferson County, is paying well. Five acres of land were recently sold there for \$12,000, and the black sand assays very rich.

Some new placer diggings in Bucksin gulch prospect from twenty-five cents to one dollar to the pan of dirt on the "bed rock."

The Ni-Wot, Boulder County, has already produced some \$290,000 in gold.

Over five hundred men are now at work on the San Juan mines, and are doing well. With the opening of another season the full tide of the prosperity of that region will have begun to set in.

From August 1st to 31st, inclusive, the Stewart reduction works, at Georgetown, turned out and shipped \$42,204.86 bullion, coin value. The product for the past eight months has been \$151,348.86.

Mining matters have been surpassingly prosperous in Summit County this season. The yield of placer gold is in excess of that of any previous year since '59. The operations have also been less expensive than heretofore.

The placer diggings on Four Mile Creek, in the Gold Hill country, are paying this season at the rate of five dollars per day to the man. A party of six Frenchmen, old-time California miners, wearing cow-bird boots, corduroy pants, flannel shirts, and shocking bad hats, own about eight hundred feet of flume. These Frenchmen say it will take them between two and three years to exhaust their available ground.

Many parties are engaged in exploring the newly discovered silver districts near Pueblo. The progress of mining affairs in that vicinity during the past six months has been quite marvellous. There is no doubt in the world but that the Hardscrabble district will prove very rich.

Improvements to the amount of \$65,000 will be made on the Caribou mine, by the middle of November, in the shape of a hundred and twenty horse-power engine, four hoisting spools, and other machinery. The ledge is said to be improving in thickness and quality as operations are extended.

Some idea of the mining matters about Georgetown may be formed from the fact that about sixty men are working the various veins intersected by the Marshall tunnel. It is probable that this force will be increased to one hundred this Fall. The opinion of the best judges is, that the mineral wealth rendered available by means of the Marshall tunnel cannot be comparatively estimated.

During the first six months of the present year, the known production of Park County mines, has been as follows: Smelting works—ores bought and in stock, lead riches and bullion at the Dudley and Alma works, valued at \$222,600; bullion produced from gulch mines, about \$8,000; ores shipped to Denver and elsewhere, coin value, \$22,000; total value, \$232,600.

The bars along the Arkansas River, for the limited amount of work that is being done, are paying handsomely. Two miles below Granite, Eley & Co. are taking out from \$10 to \$20 per day to the man, with two lengths of boxes. They are putting in a pump and will sink a shaft to bed rock. They have turned the river for a considerable distance, and will work their claims all Winter.

The Pueblo *Chief* says: Eighteen months ago, silver ores and the minerals found in mining countries, were scarcely ever met with in public places, and the mines of Hardscrabble, and even of San Juan, were comparatively unknown. But now valuable minerals and precious ores are on exhibition in almost every shop window, counter, or office table, and fine cabinets of ores and minerals are in the possession of most of our business and professional men. In fact the progress of mining affairs in Pueblo, during the last six months, has been truly marvellous, and argues favorably for the final success of this most important industry. There is no doubt but Southwestern Colorado is one of the best silver mining countries in the world.

More ore is now being taken out in Gilpin County than has been before for the past four years, and it is expected by the miners that one month from now, double the amount will be produced, as numerous rich strikes have been made in the mines around Nevada. Some of the mines there which have been in "cap" for the past year or so, have reached some of the richest looking ore that has been found in the country. Among the paying mines are the American Flag, Huhert, Forks, Prize, Kansas, and others.

### AGRICULTURE, STOCK AND WOOL GROWING, ETC.

The Colorado Farmer says that two years ago, Stephen Holden, of Bijon Basin, Colorado, invested \$2,000 in one thousand grade ewes—a cross between the Merino and Mexican—and has now thirty-six hundred sheep by his original investment. By using the very best blooded Merino bucks, the increase is of high grade, and is growing into one of the finest flocks in the country. Beside this successful increase of his flock, he has sold from it in the two years \$5,000 worth of wool. He has two blooded bucks, one of which sheared a fleece weighing twenty-two and the other twenty-seven pounds this year.

The Southern Colorado Fair will open at Pueblo on the 15th inst.

This year's wool crop for Colorado and New Mexico, is estimated at 5,000,000 pounds.

The wheat crop of Colorado will average twenty-five bushels to the acre.

The potato has a wonderfully vigorous growth on the elevated plateaus of the Rocky Mountains. It grows practically up to the line of perpetual snow.

California sheep-raisers are bringing their flocks into Colorado.

A gardener tells the Pueblo *Chieftain* that he has, during the past year, cleared above all expenses, at the rate of one thousand dollars an acre, for the amount of land cultivated.

The increase in the amount of small grain raised in the Arkansas Valley this year over last, will be at least 4,000 bushels, a product for this year of 20,000 bushels of grain, including wheat, rye, oats, and barley.

Thirty-three to thirty-five bushels is the average per acre of a crop of wheat raised on one hundred and twelve acres, by Mr. W. D. Arnett, not far from Denver. This is the fifth successive year that wheat has been raised on the land, and yet but little or no sign of weakness is indicated.

The stock range south of Pueblo and Huerfano Counties, says the Pueblo *People*, now presents a splendid appearance. Grass was never better and the supply of water is plentiful in all the streams and in the small lakes scattered over the country. As a consequence, cattle are in excellent condition.

The following crop reports are from the Colorado *Agriculturist*: Messrs. A. K. Baker and son, of St. Vrain Valley, near Longmont, Colorado, report a yield of thirty bushels of wheat per acre from an eight-acre field. The balance of their crop will average about twenty bushels per acre. Mr. Cutler Porter, near St. Vrain, Colorado, says he raised two hundred bushels of wheat from four acres of land, a few years ago. This season, however, his crop is a total loss on account of the depredations of grasshoppers. Mr. P. J. Hinman, who owns a rancho on Left Hand Creek, Boulder County, says he has averaged twenty-five bushels of wheat per acre, every season he has farmed in that valley—some eight or nine, we believe—and that his wheat crop one year was sold for \$10,000.

Mr. Baldwin, an experienced horse-breeder in Boulder County, Colorado, says: The winter grazing of Colorado is better for horses than cattle. The former nip closer our fine, short, rich grasses, and will paw through the snow to get at it, in time of storms. In winter it is commonly coldest just before sundown. At such times I have noticed that the leader of a band of horses will start, and by nipping others and running, soon get the whole band in motion, and so run in a circle until they are thoroughly warmed up. Only colts until two years old need special care. To their highest development it is essential that they be well fed. Grain is necessary. No animal will develop well if poorly fed when young. The idea that colts shall not have grain is a mistaken one. After two years let them take care of themselves, unless worked. There can be found no better region than this for the inexpensive growing and highest development of this noble animal. The business is yet in its infancy in Colorado. The capabilities of the country for this branch of business, exceed those of any other section between the Atlantic and Pacific coasts. It is a business unlike most others; never overdone. Railroads increase rather than decrease the demand for fine horses. Horses keep to their range better than sheep or cattle. It is the most pleasant and most profitable branch of stock-growing—the best business in Colorado.

A correspondent of the Colorado *Agriculturist* says: Why have we no experienced ram-breeder here? There is a splendid opening. Not a sheep-raiser that I know of in the country makes a specialty of the business. The number of rams required in Colorado alone this coming season will amount to at least 2,500 head, increasing proportionately each succeeding year.

## RAILWAY INTELLIGENCE.

The Boulder Valley Railroad is now completed and trains are running regularly.

The work of grading on the southward extension of the Denver and Rio Grande Railway is going forward rapidly, and a few more weeks will see the forty miles now under contract completed.

The Georgetown *Miner* says: Work has been commenced on the extension of the Colorado Central Railroad from Floyd Hill; and we have the information direct that it will be pushed forward as rapidly as possible. It is the intention to push the grading with a full force of bands.

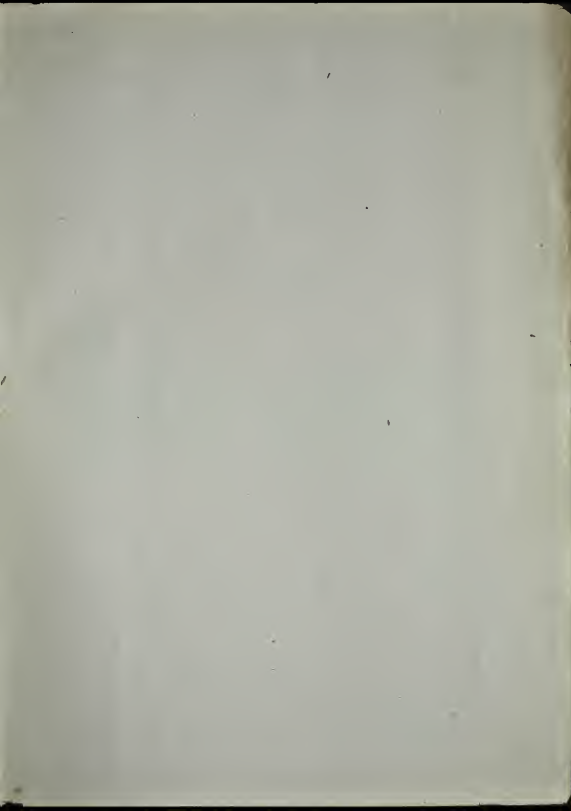
The Arkansas Valley Railway is completed to within a very short distance of Las Animas. The *Leader* says it is settled that the road will cross the river about three miles above Las Animas, and that a new town is being surveyed by the company on the river bottom near Judge Moore's.

The passenger traffic on the Denver and Rio Grande Railway shows comparatively little falling-off from what it has been through the summer, an evidence that Colorado is fast gaining a reputation as a fall and winter resort. Freight traffic which fell off somewhat in July and August is increasing again.

The Greeley *Star* says that the railroad business at Greeley is fast assuming gigantic proportions, and indicates a marvellous growth in trade and travel. During the twelve months ending July 31st, the Denver Pacific road handled nearly 12,000,000 pounds of Greeley freight, sold about \$10,000 worth of passenger tickets, and received in money the sum of \$69,966.64.

The report of the Colorado Central Railway Company shows that the net earnings of the road for the months of May, June, and July, amounted to \$3,490 per mile, being a third more than the estimate. The system required to be completed consists of two hundred and eighty-one miles of railroad,—forty-four miles of mountain road, and two hundred and thirty-seven of plain road. Twenty-five miles of the mountain division are constructed and in operation, and will be narrow gauge,—nineteen remain to be built. On the main line sixty miles are in operation; one hundred and ten miles graded and ready for the ties; and the balance being graded.

The Pueblo *Chieftain*, in speaking of the necessity of an Eastern connection for Southern Colorado, says: The growing importance of our mines, the large influx of population, the cattle and sheep interests that are rapidly expanding around us, are all sufficient to justify the building of a hundred miles of railroad without delay, thus uniting us with one of the other lines at Fort Lyon, or near there, and therefore affording a more direct eastern communication by rail. The business of our merchants is multiplying so fast that it is almost impossible for them to keep up their supplies, and meet the ever increasing demand. Towns are springing up in the Arkansas valley, and, on every hand, we notice permanent improvements rounding into form and assuming magnificent proportions. No more inviting region can be found, over which to construct and put in operation a railroad, than that lying between here and the state line.



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